

Fig.1

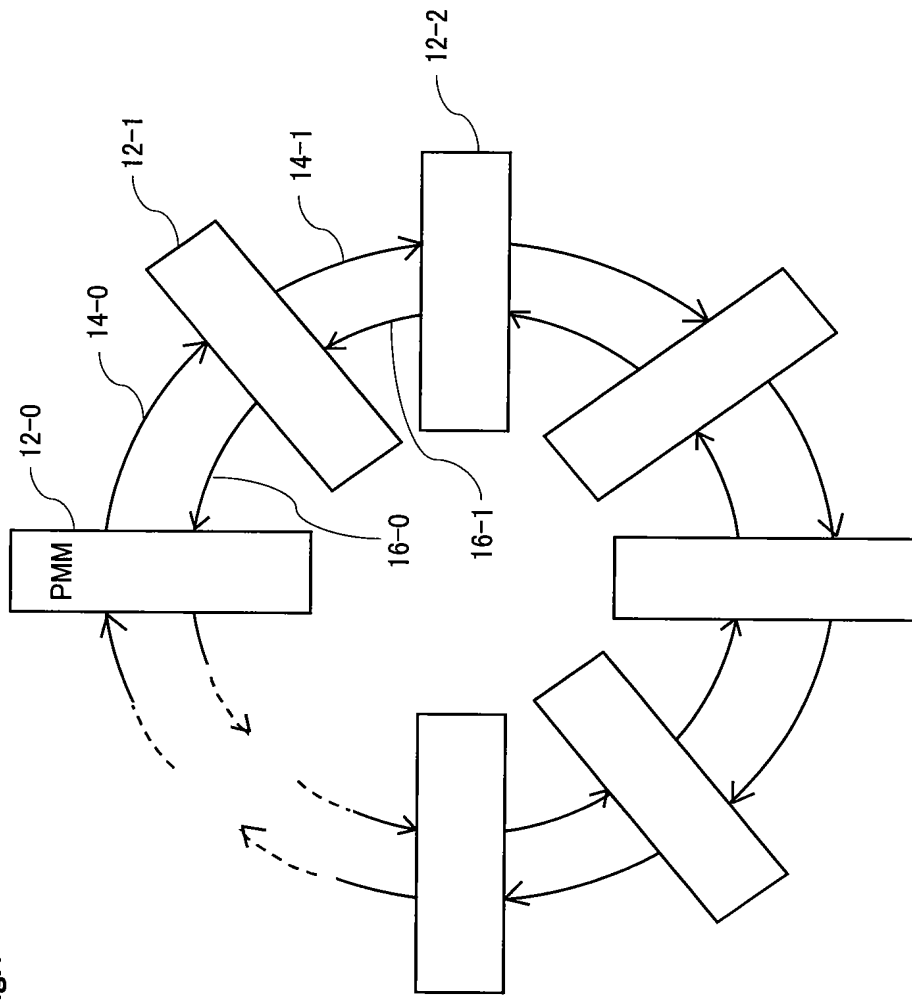


Fig.2

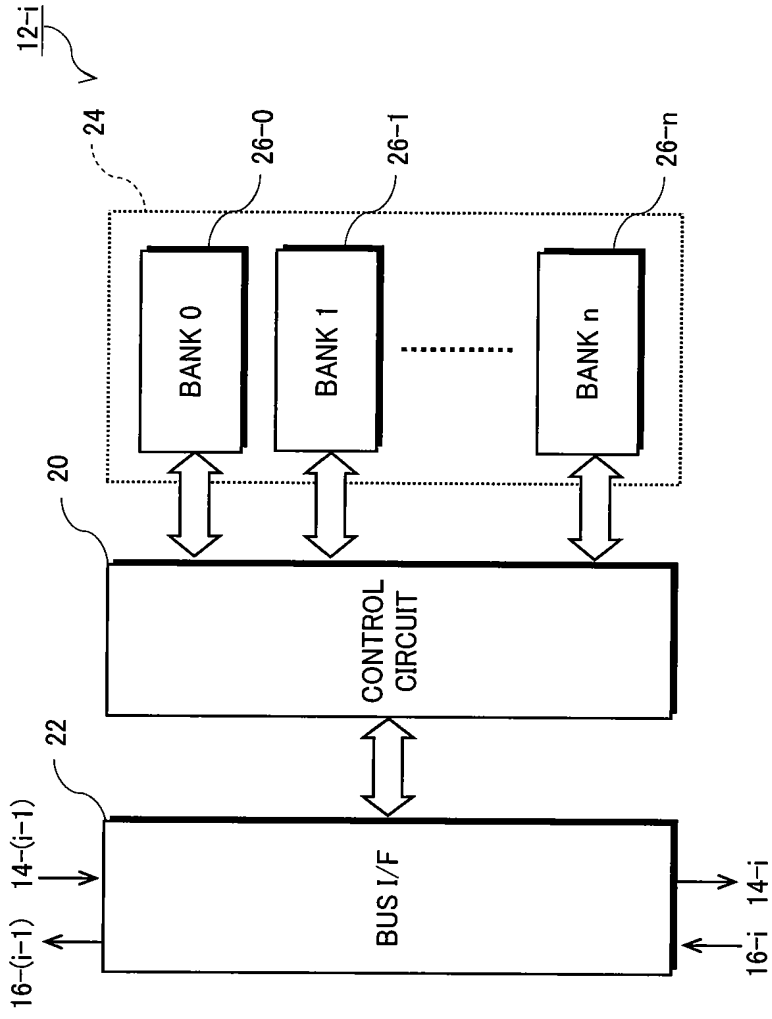


Fig.3

	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	18	168	55
1	MALE	21	172	64
2	FEMALE	24	159	48
3	FEMALE	16	172	48
4	MALE	28	181	78
5	FEMALE	20	166	55
6	FEMALE	16	168	52
7	MALE	33	174	65
8	MALE	24	177	64
9	FEMALE	18	170	55

Fig.4

SEX		AGE		HEIGHT		WEIGHT	
VL		VNo		VNo		VNo	
0 MALE		0 1		0 2		0 2	
1 FEMALE		1 3		1 4		1 3	
2		2 4		2 0		2 0	
3		3 0		3 4		3 0	
4		4 5		4 7		4 5	
5		5 2		5 1		5 2	
6		6 0		6 2		6 1	
7		7 6		7 5		7 4	
8		8 4		8 6		8 3	
9		9 1		9 3		9 2	
ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	
VL		VL		VL		VL	
0 48		0 16		0 159		0 48	
1 52		1 18		1 166		1 52	
2 55		2 20		2 168		2 55	
3 64		3 21		3 170		3 64	
4 65		4 24		4 172		4 65	
5 78		5 28		5 174		5 78	
		6 33		6 177			

Fig.5

OFFSET= 0

PMM-0				
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	18	168	55
1	MALE	21	172	64
2	FEMALE	24	159	48

OFFSET= 3

PMM-1				
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	16	172	48
1	MALE	28	181	78

OFFSET= 5

PMM-2				
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	20	166	55
1	FEMALE	16	168	52
2	MALE	33	174	65

OFFSET= 8

PMM-3				
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	MALE	24	177	64
1	FEMALE	18	170	55

Fig.6

SEX (PMM-0)			AGE (PMM-0)			HEIGHT (PMM-0)			WEIGHT (PMM-0)		
VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	MALE	0	0	18	0	0	159	0	0	48	0
1	FEMALE	1	1	21	1	1	168	1	1	55	1
2			2	24	2	2	172	2	2	64	2
ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER		

GOrd	OrdSet
0	0
1	1
2	2
ASCENDING ORDER	

SEX (PMM-1)			AGE (PMM-1)			HEIGHT (PMM-1)			WEIGHT (PMM-1)		
VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	MALE	0	0	16	0	0	172	0	0	48	0
1	FEMALE	1	1	28	1	1	181	1	1	78	1
ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER		

GOrd	OrdSet
0	0
1	1
ASCENDING ORDER	

0	-	0
1	-	1
2	-	2

ASCENDING ORDER

0	-	0
1	-	1

ASCENDING ORDER

SEX (PMM-3)		AGE (PMM-3)		HEIGHT (PMM-3)		WEIGHT (PMM-3)	
VNo	GVNo	VNo	GVNo	VNo	GVNo	VNo	GVNo
0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1
VL 0 MALE 1 FEMALE		VL 0 18 1 24		VL 0 170 1 177		VL 0 55 1 64	
ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

Fig.8

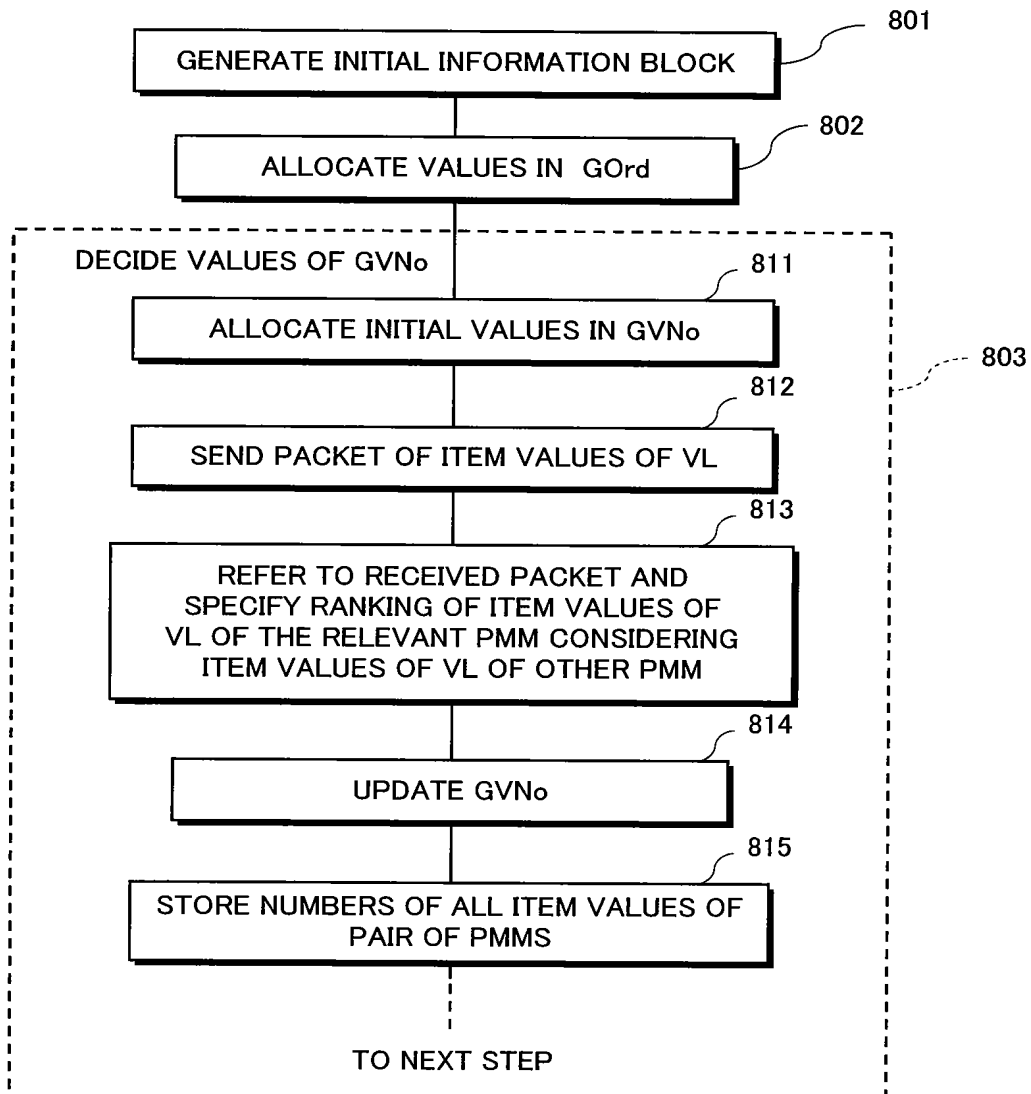


Fig.9

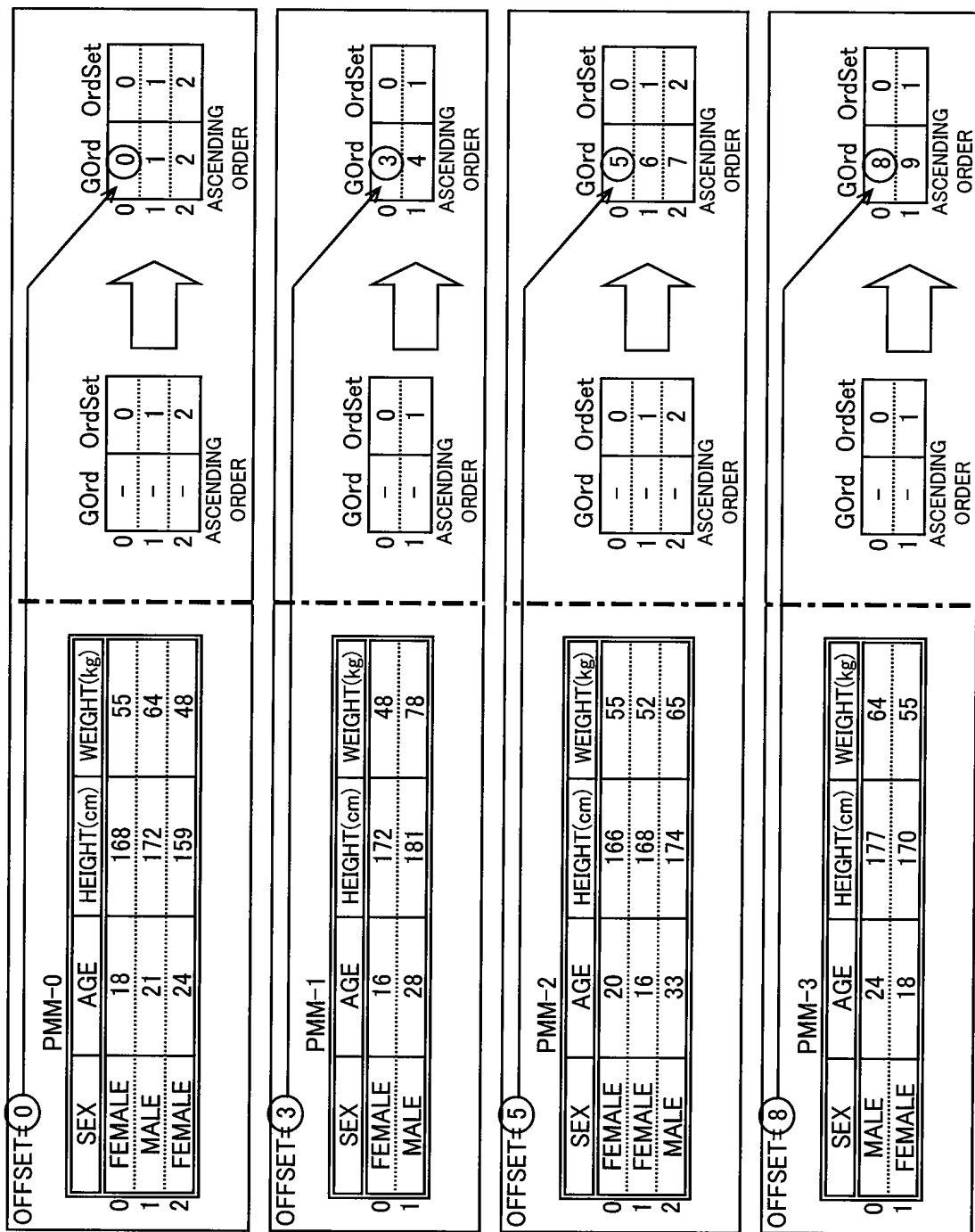


Fig.10

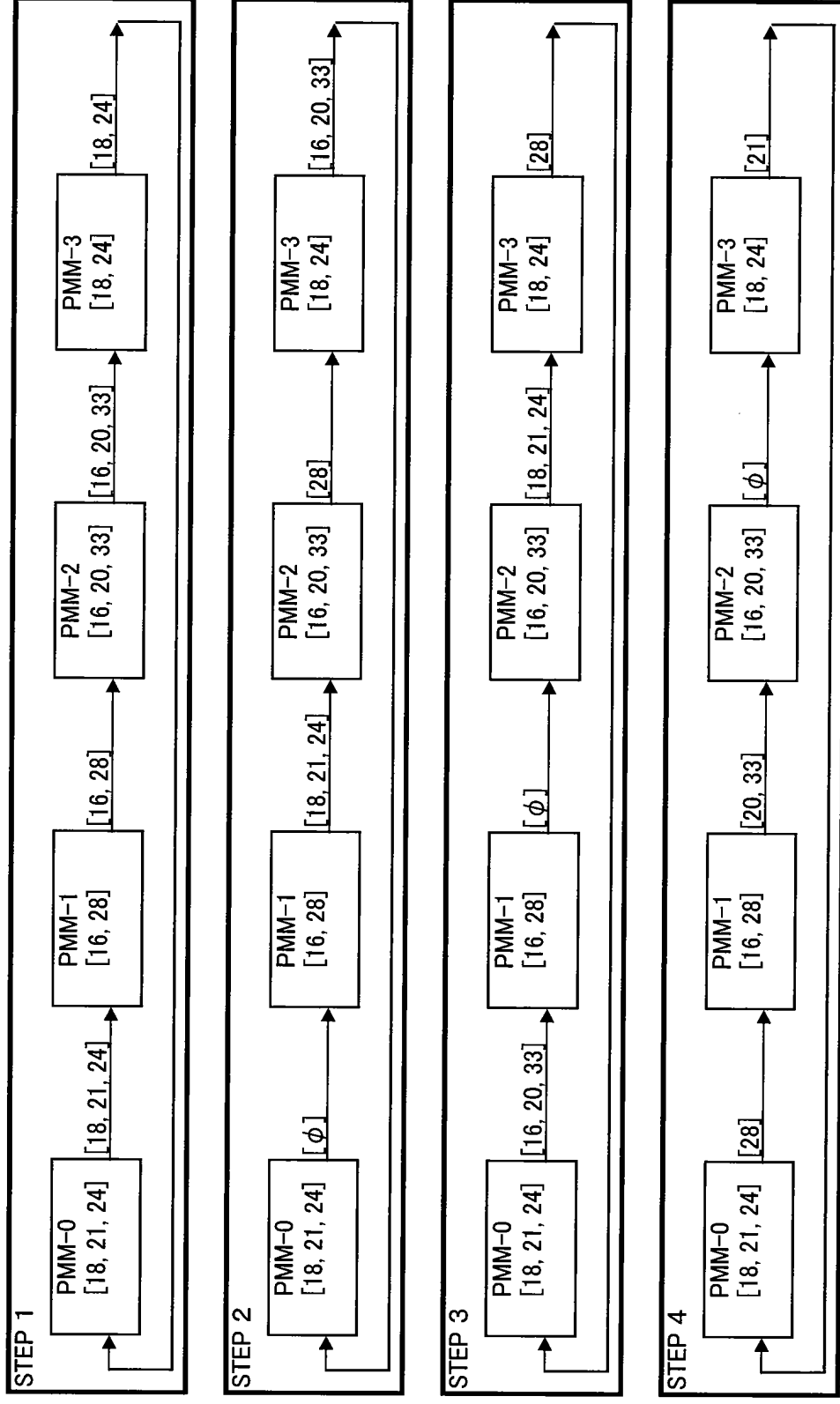


Fig.11

STEP 1

RECEIVED LIST			
PMM-0 [18, 24](ASCENDING ORDER)	PMM-1 [18, 21, 24](ASCENDING ORDER)	PMM-2 [16, 28](ASCENDING ORDER)	PMM-3 [16, 20, 33](ASCENDING ORDER)

STEP 2

RECEIVED LIST			
PMM-0 [18, 24](ASCENDING ORDER) [16, 20, 33](ASCENDING ORDER)	PMM-1 [18, 21, 24](ASCENDING ORDER) [ϕ](ASCENDING ORDER)	PMM-2 [16, 28](ASCENDING ORDER) [18, 21, 24](ASCENDING ORDER)	PMM-3 [16, 20, 33](ASCENDING ORDER) [28](ASCENDING ORDER)

STEP 3

RECEIVED LIST			
PMM-0 [18, 24](ASCENDING ORDER) [16, 20, 33](ASCENDING ORDER) [28](ASCENDING ORDER)	PMM-1 [18, 21, 24](ASCENDING ORDER) [ϕ](ASCENDING ORDER) [16, 20, 33](ASCENDING ORDER)	PMM-2 [16, 28](ASCENDING ORDER) [18, 21, 24](ASCENDING ORDER) [ϕ](ASCENDING ORDER)	PMM-3 [16, 20, 33](ASCENDING ORDER) [28](ASCENDING ORDER) [18, 21, 24](ASCENDING ORDER)

STEP 4

RECEIVED LIST			
PMM-0 [18, 24](ASCENDING ORDER) [16, 20, 33](ASCENDING ORDER) [28](ASCENDING ORDER) [21](ASCENDING ORDER)	PMM-1 [18, 21, 24](ASCENDING ORDER) [ϕ](ASCENDING ORDER) [16, 20, 33](ASCENDING ORDER) [28](ASCENDING ORDER)	PMM-2 [16, 28](ASCENDING ORDER) [18, 21, 24](ASCENDING ORDER) [ϕ](ASCENDING ORDER) [20, 33](ASCENDING ORDER)	PMM-3 [16, 20, 33](ASCENDING ORDER) [28](ASCENDING ORDER) [18, 21, 24](ASCENDING ORDER) [ϕ](ASCENDING ORDER)

Fig.12

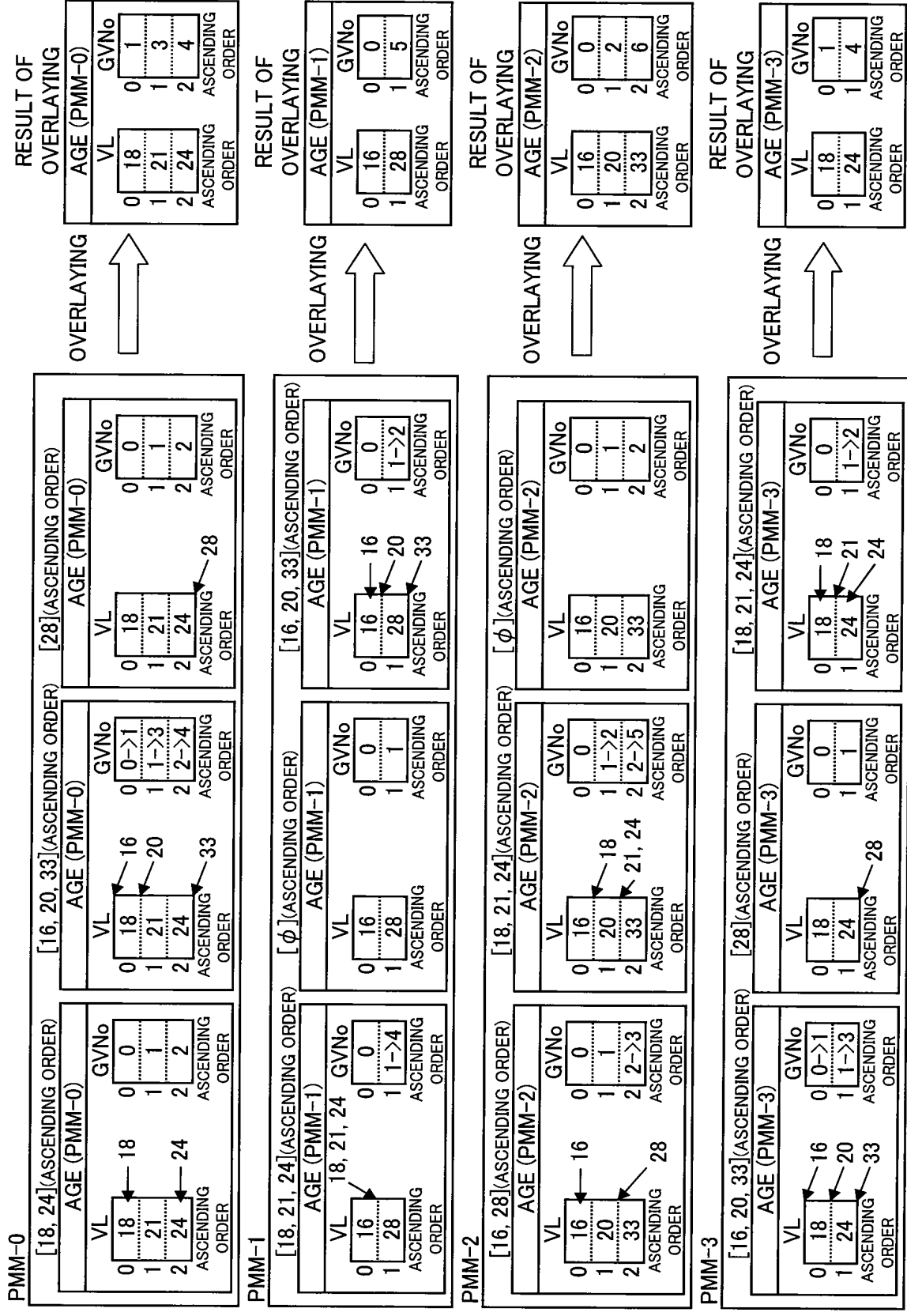


Fig.13A

	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	18	168	55
1	MALE	21	172	64
2	FEMALE	24	159	48
3	FEMALE	16	172	48
4	MALE	28	181	78
5	FEMALE	20	166	55
6	FEMALE	16	168	52
7	MALE	33	174	65
8	MALE	24	177	64
9	FEMALE	18	170	55

Fig.13B

OrdSet	SEX		AGE		HEIGHT		WEIGHT	
	VNo	VL	VNo	VL	VNo	VL	VNo	VL
0	1	0 MALE	0	1	0	2	0	48
1	0	1 FEMALE	1	3	1	4	1	52
2	1	ASCENDING ORDER	2	4	2	0	2	55
3	1		3	0	3	4	0	64
4	0		4	5	4	7	5	65
5	1		5	2	5	1	2	78
6	1		6	0	6	2	1	ASCENDING ORDER
7	0		7	6	7	5	4	
8	0		8	4	8	6	3	
9	1		9	1	9	3	2	

Fig.14

OFFSET= 0

PMM-0				
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	18	168	55
1	MALE	21	172	64
2	FEMALE	24	159	48

OFFSET= 3

PMM-1				
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	16	172	48
1	MALE	28	181	78

OFFSET= 5

PMM-2				
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	20	166	55
1	FEMALE	16	168	52
2	MALE	33	174	65

OFFSET= 8

PMM-3				
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	MALE	24	177	64
1	FEMALE	18	170	55

Fig.15

OFFSET= 0

SEX (PMM-0)			AGE (PMM-0)			HEIGHT (PMM-0)			WEIGHT (PMM-0)		
VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	1	0	0	0	1	0	0	159	0	0	0
1	0	1	1	1	3	1	2	168	1	2	2
2	1		2	2	4	2	0	172	2	2	3
ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER		

OFFSET= 3

SEX (PMM-1)			AGE (PMM-1)			HEIGHT (PMM-1)			WEIGHT (PMM-1)		
VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	1	0	0	0	0	0	0	172	0	0	0
1	0	1	1	1	5	1	1	181	1	1	5
ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER		

OFFSET= 5

SEX (PMM-2)			AGE (PMM-2)			HEIGHT (PMM-2)			WEIGHT (PMM-2)		
VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	1	0	0	0	0	0	0	166	0	0	1
1	1	1	1	1	2	1	1	168	1	2	2
2	0		2	2	6	2	2	174	2	2	4
ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER		

OFFSET= 8

SEX (PMM-3)			AGE (PMM-3)			HEIGHT (PMM-3)			WEIGHT (PMM-3)		
VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	0	0	0	0	1	0	1	170	0	0	2
1	1	1	1	1	4	1	0	177	1	6	3
ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER			ASCENDING ORDER		

Fig.16A

E AGE	EVENT
18	H2
18	C1
20	A
22	C2
22	P1
27	P2
33	M

Fig.16B

E AGE		EVENT	
VN _o	0	VN _o	0
	1		1
	2		2
	3		3
	4		4
	5		5
	6		6
VL		VL	
0		0	
1		1	
2		2	
3		3	
4		4	
ASCENDING ORDER		ASCENDING ORDER	

Fig.17

PMM-0

OFFSET = 0

	E AGE	EVENT
0	18	H2
1	18	C1

PMM-1

OFFSET = 2

	E AGE	EVENT
0	20	A
1	22	C2

PMM-2

OFFSET = 4

	E AGE	EVENT
0	22	P1
1	27	P2

PMM-3

OFFSET = 6

	E AGE	EVENT
0	33	M

Fig.18

OFFSET= 0

	GOrd	OrdSet
0	0	0
1	1	1

ASCENDING
ORDER

E AGE (PMM-0)			EVENT (PMM-0)		
VNo	VL	GVNo	VNo	VL	GVNo
0 0	0 18	0 0	0 1	0 C1	0 1
1 0	1 ASCENDING ORDER	1 ASCENDING ORDER	1 0	1 H2	1 3

OFFSET= 2

	GOrd	OrdSet
0	2	0
1	3	1

ASCENDING
ORDER

E AGE (PMM-1)			EVENT (PMM-1)		
VNo	VL	GVNo	VNo	VL	GVNo
0 0	0 20	0 1	0 0	0 A	0 0
1 1	1 22	1 2	1 1	1 C2	1 2

OFFSET= 4

	GOrd	OrdSet
0	4	0
1	5	1

ASCENDING
ORDER

E AGE (PMM-2)			EVENT (PMM-2)		
VNo	VL	GVNo	VNo	VL	GVNo
0 0	0 22	0 2	0 0	0 P1	0 5
1 1	1 27	1 3	1 1	1 P2	1 6

OFFSET= 6

	GOrd	OrdSet
0	6	0

ASCENDING
ORDER

E AGE (PMM-3)			EVENT (PMM-3)		
VNo	VL	GVNo	VNo	VL	GVNo
0 0	0 33	0 4	0 0	0 M	0 4

Fig.19

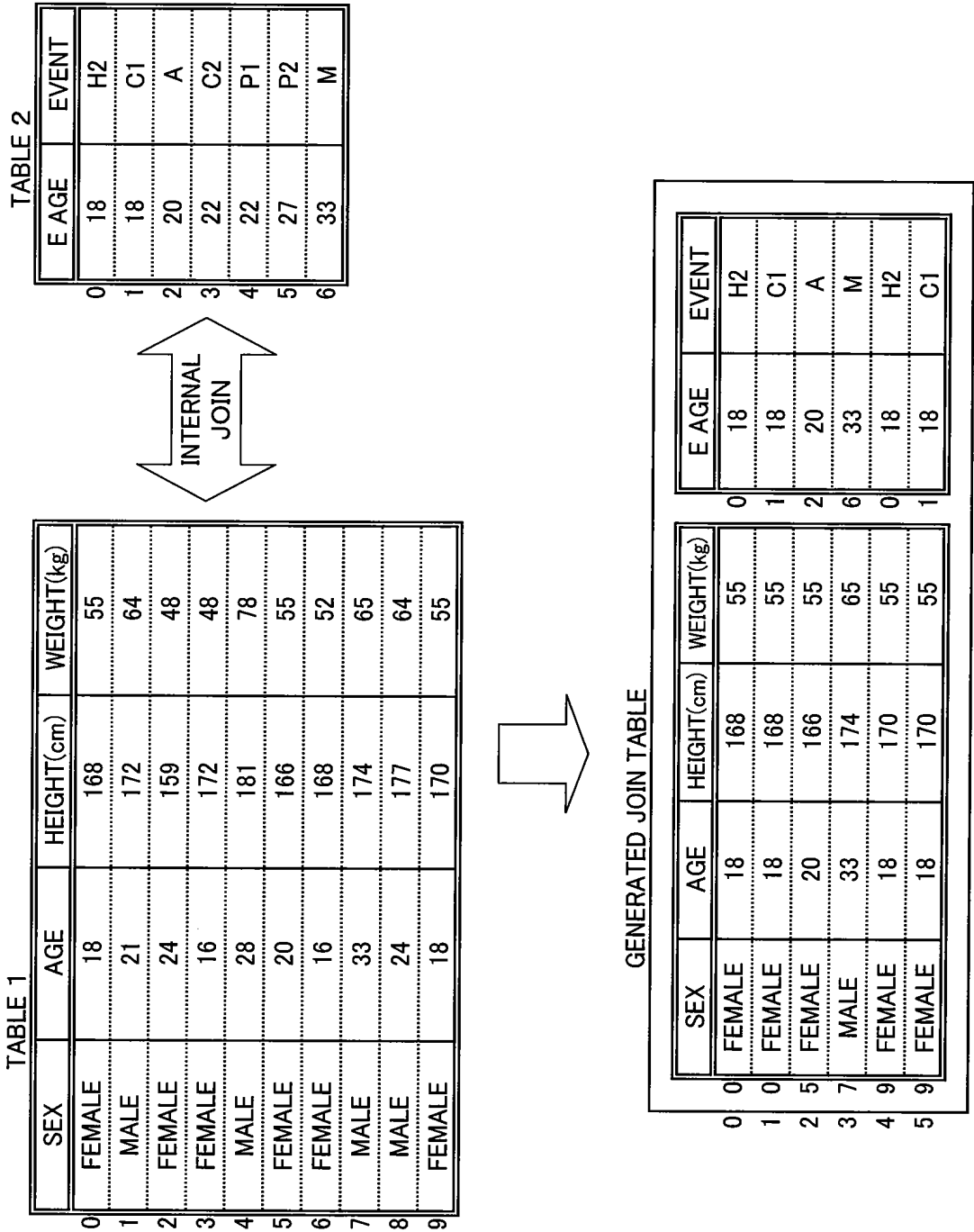


Fig.20

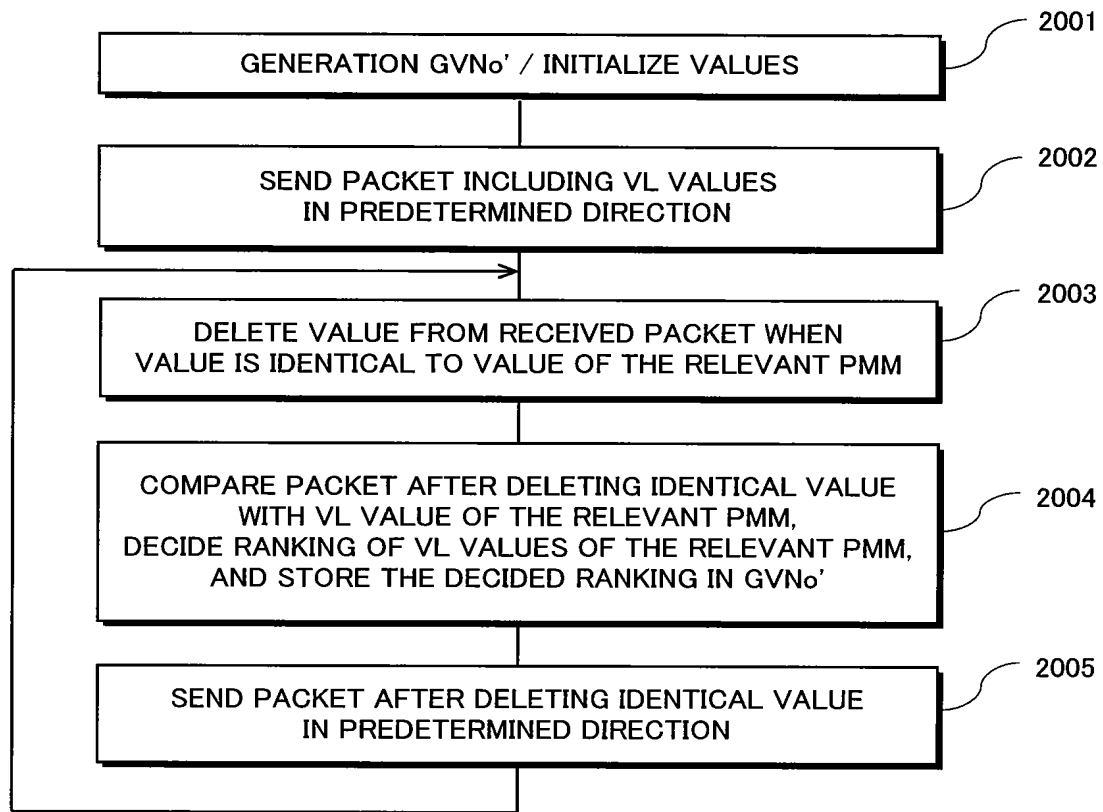


Fig.21

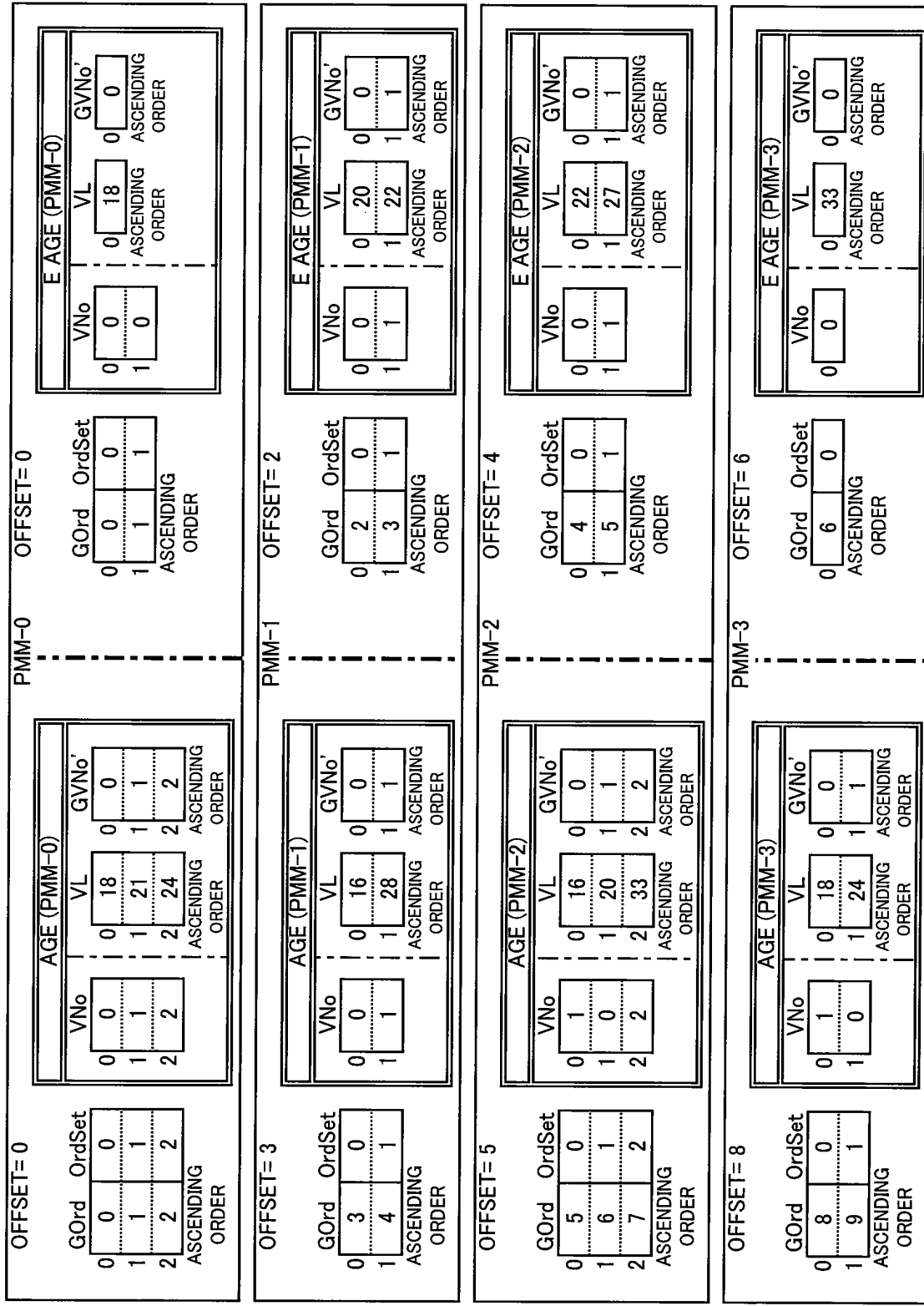


Fig.23

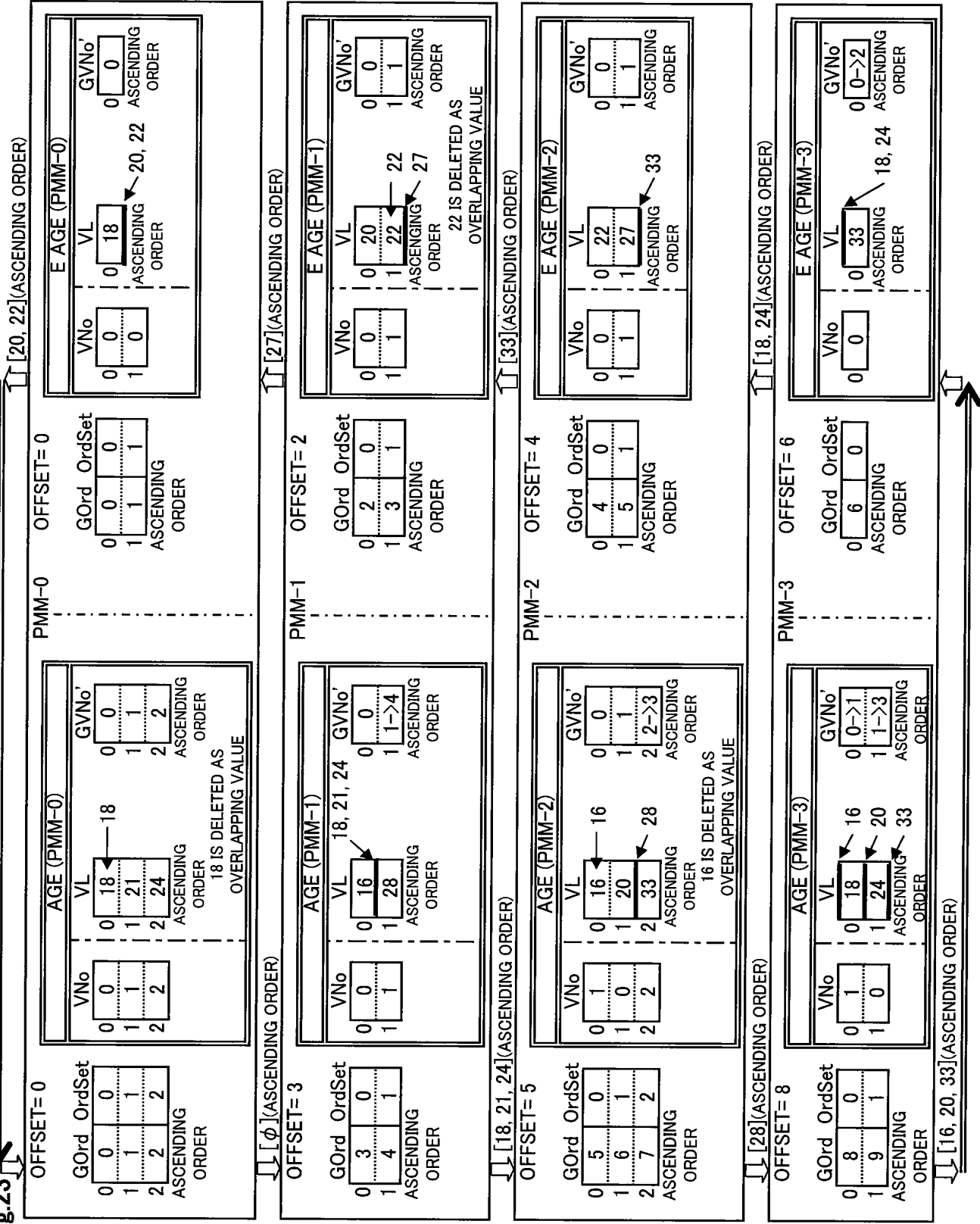


Fig.24

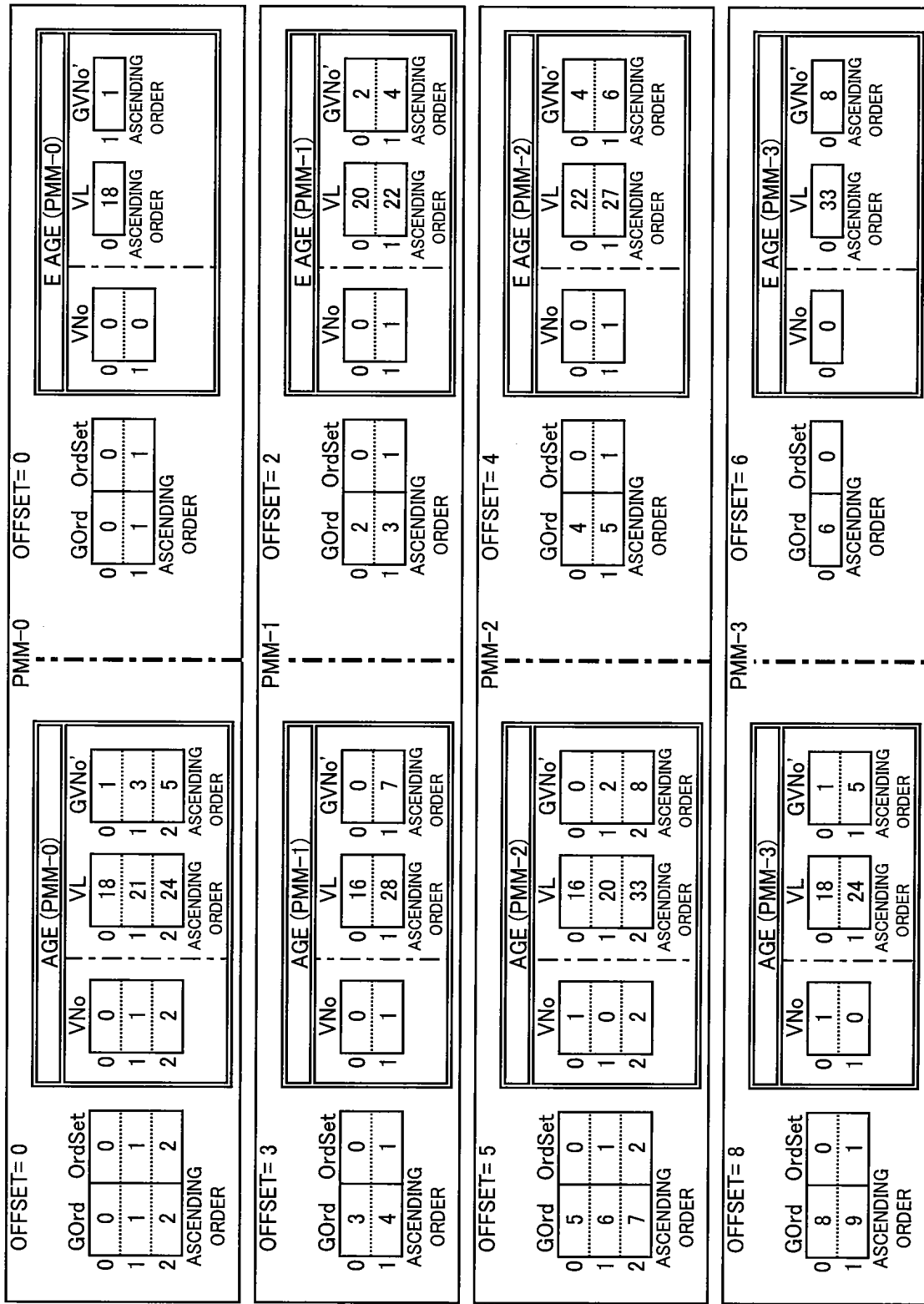


Fig.25

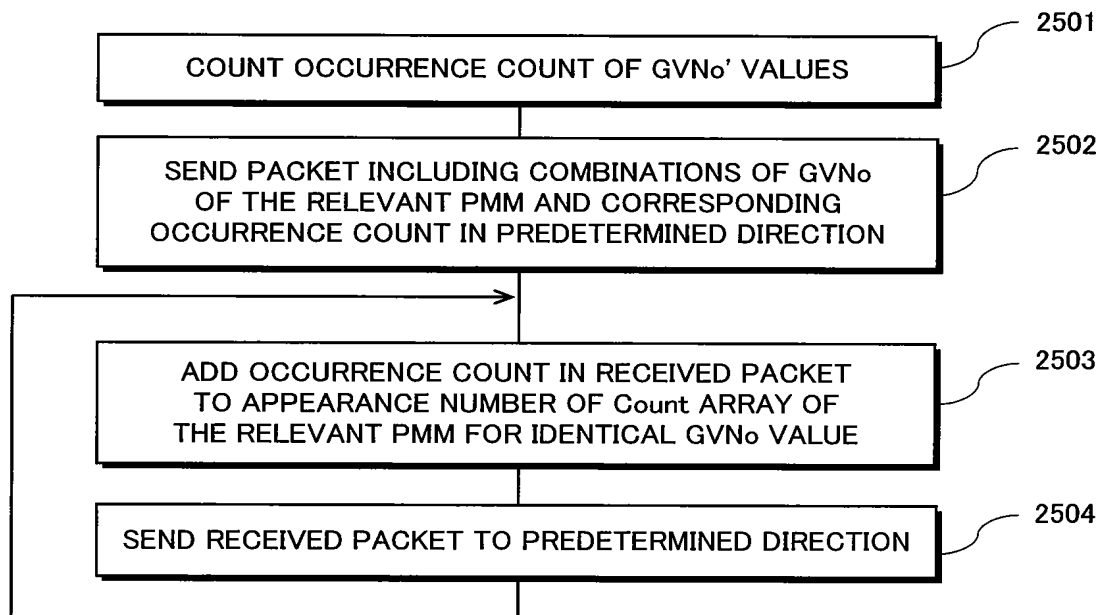


Fig.26

PMM-0 OFFSET= 0

GOrd	OrdSet
0	0
1	1

ASCENDING ORDER

E AGE				
VNo	VL	GVNo	GVNo'	Count
0	0	0	1	0
1	0	1	1	0

ASCENDING ORDER

PMM-1 OFFSET= 2

GOrd	OrdSet
0	2
1	3

ASCENDING ORDER

E AGE				
VNo	VL	GVNo	GVNo'	Count
0	0	1	2	0
1	1	2	4	0

ASCENDING ORDER

PMM-2 OFFSET= 4

GOrd	OrdSet
0	4
1	5

ASCENDING ORDER

E AGE				
VNo	VL	GVNo	GVNo'	Count
0	0	2	4	0
1	1	3	6	0

ASCENDING ORDER

PMM-3 OFFSET= 6

GOrd	OrdSet
0	6

ASCENDING ORDER

E AGE				
VNo	VL	GVNo	GVNo'	Count
0	0	4	8	0

ASCENDING ORDER

Fig.27

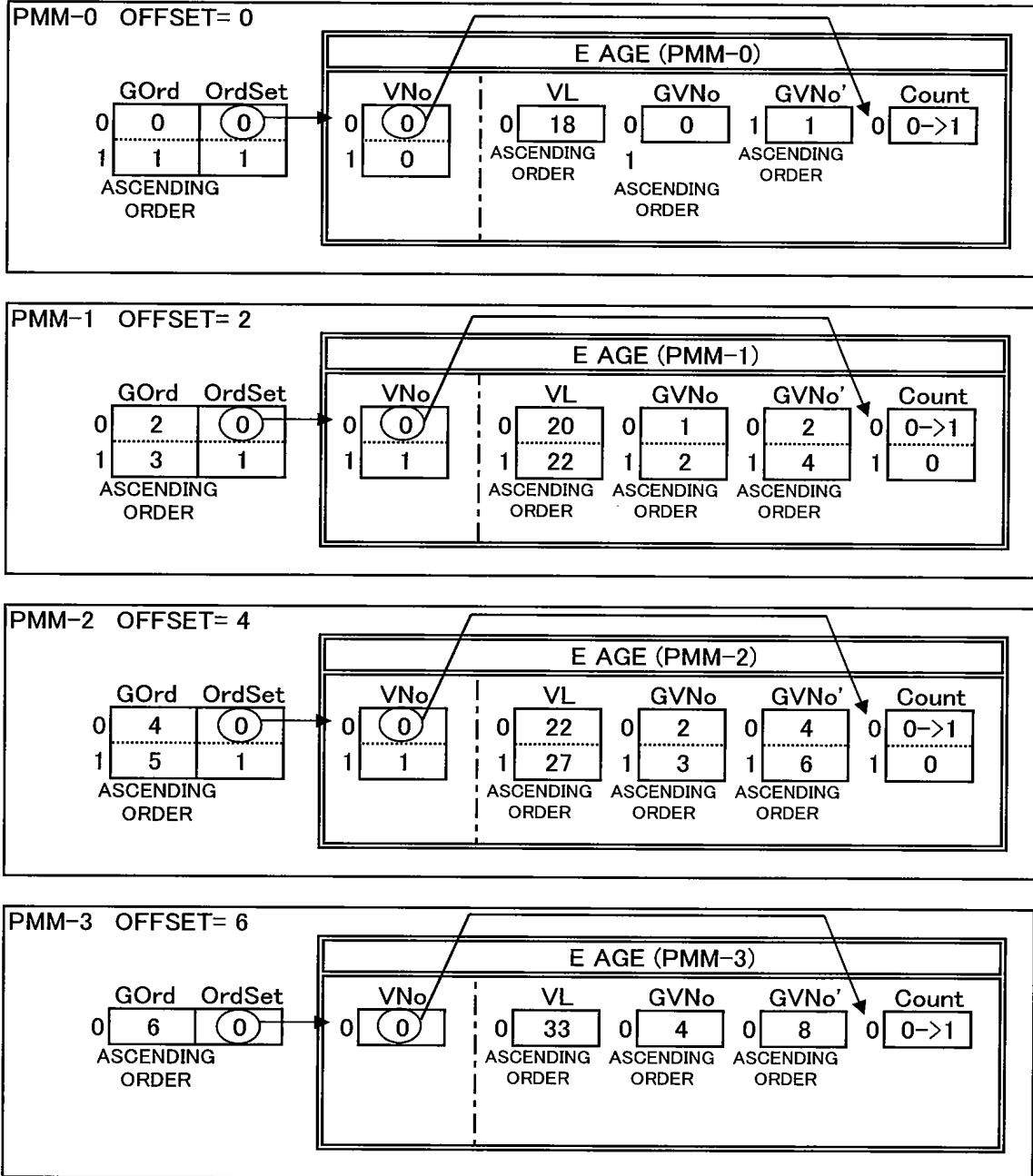


Fig.28

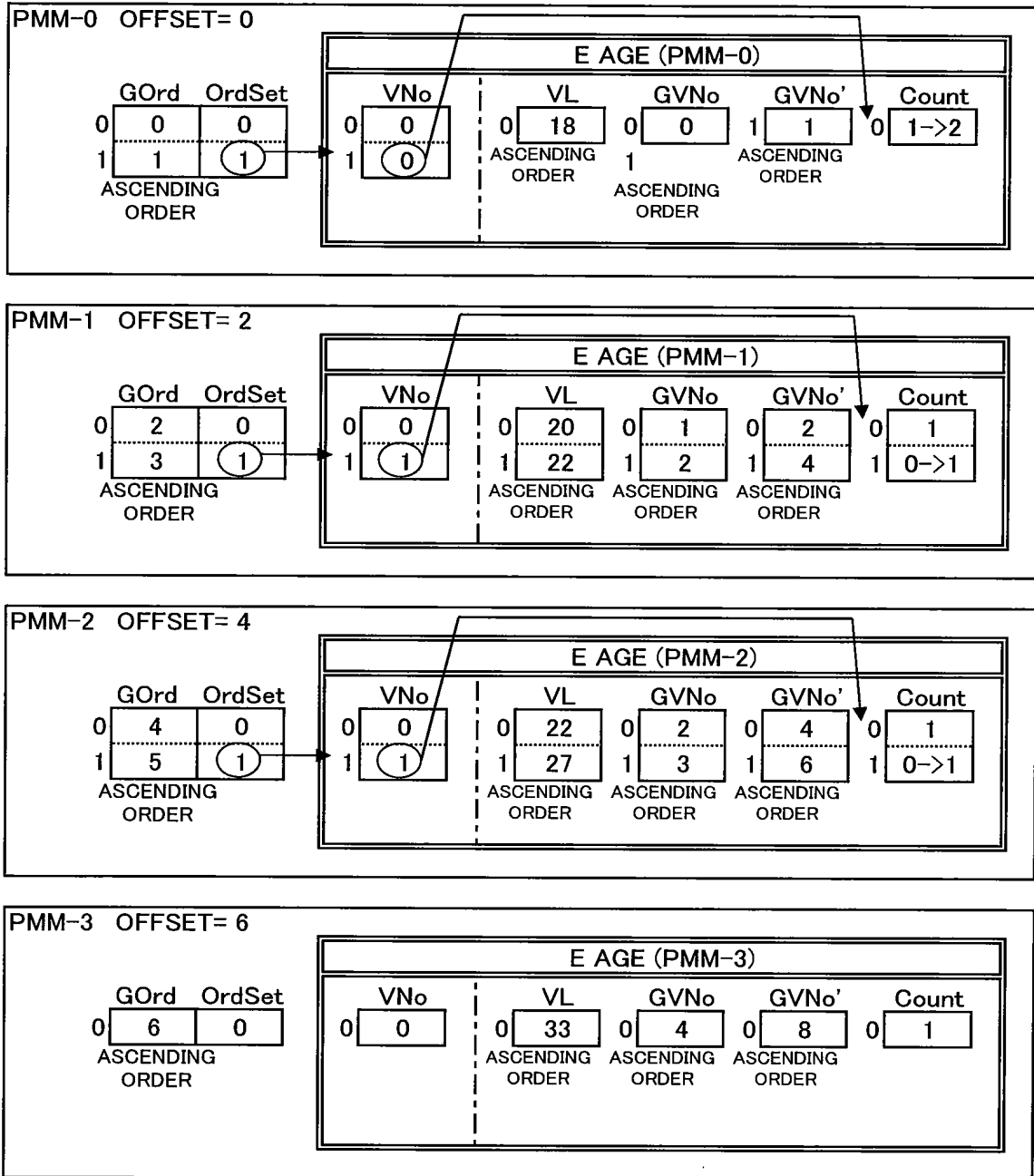


Fig.29A

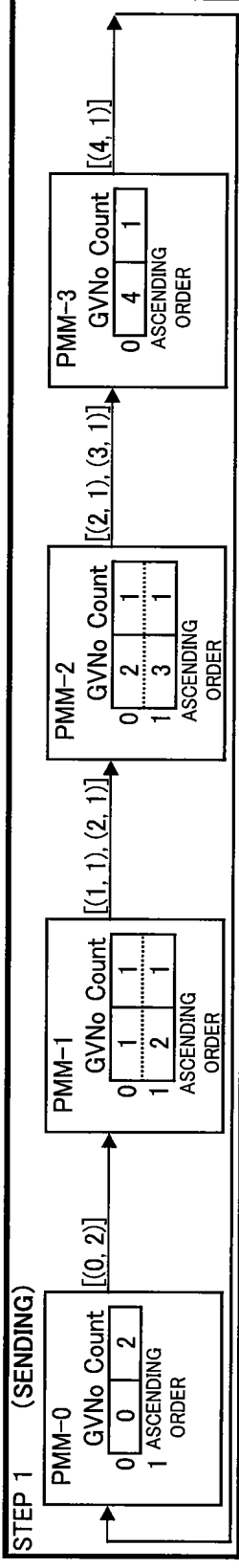


Fig.29B

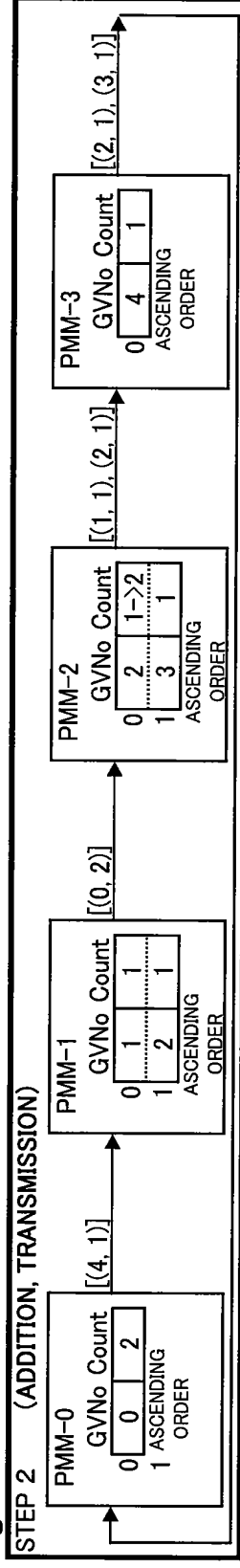


Fig.29C

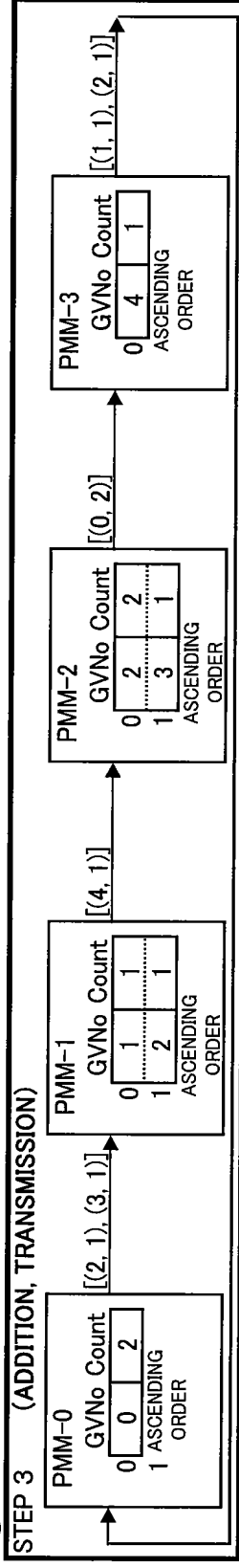


Fig.29D

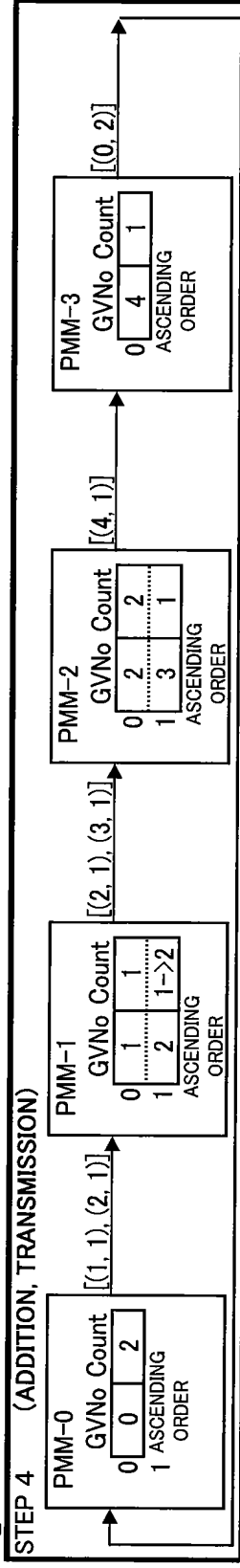


Fig.30

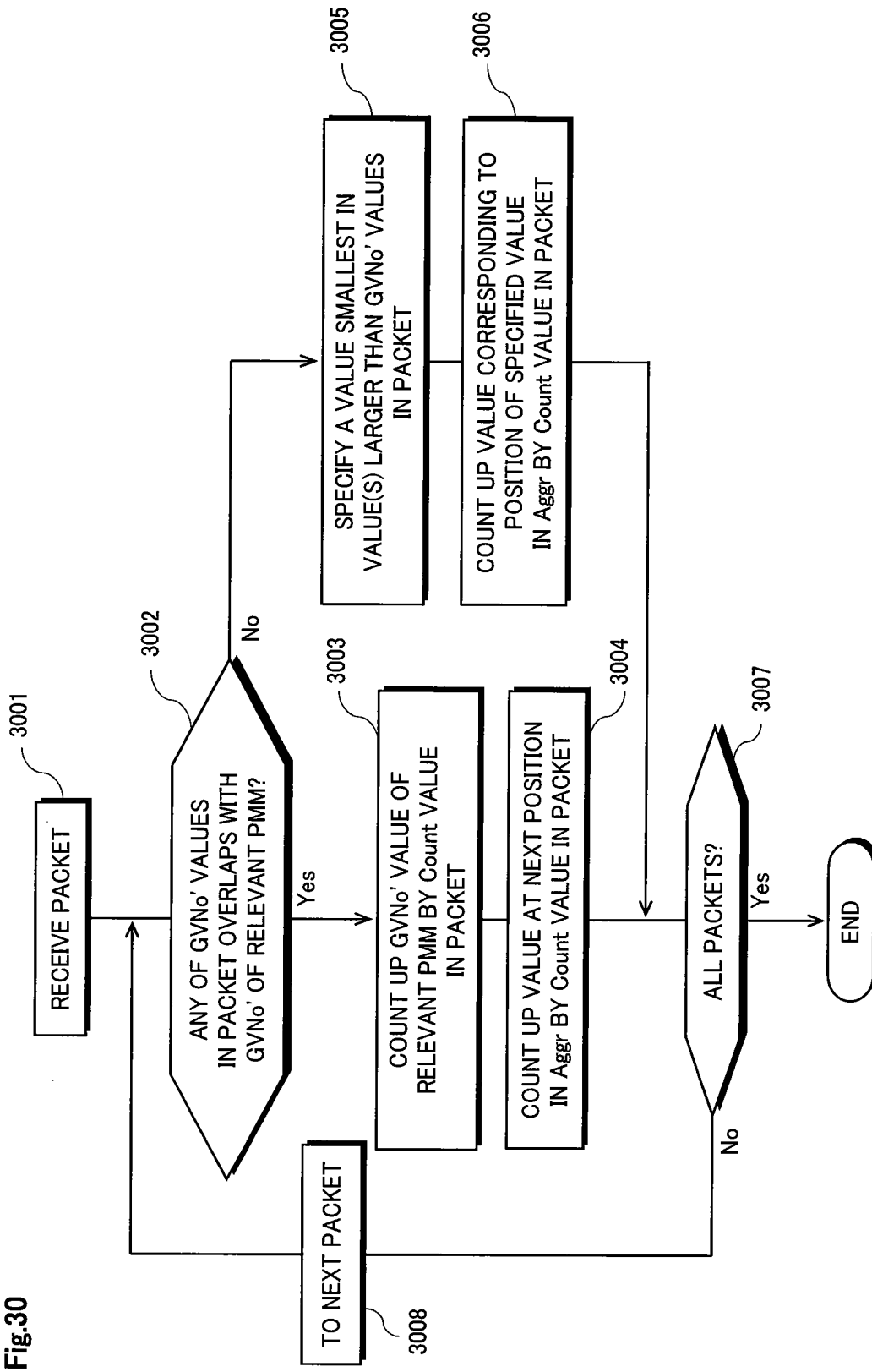


Fig.31

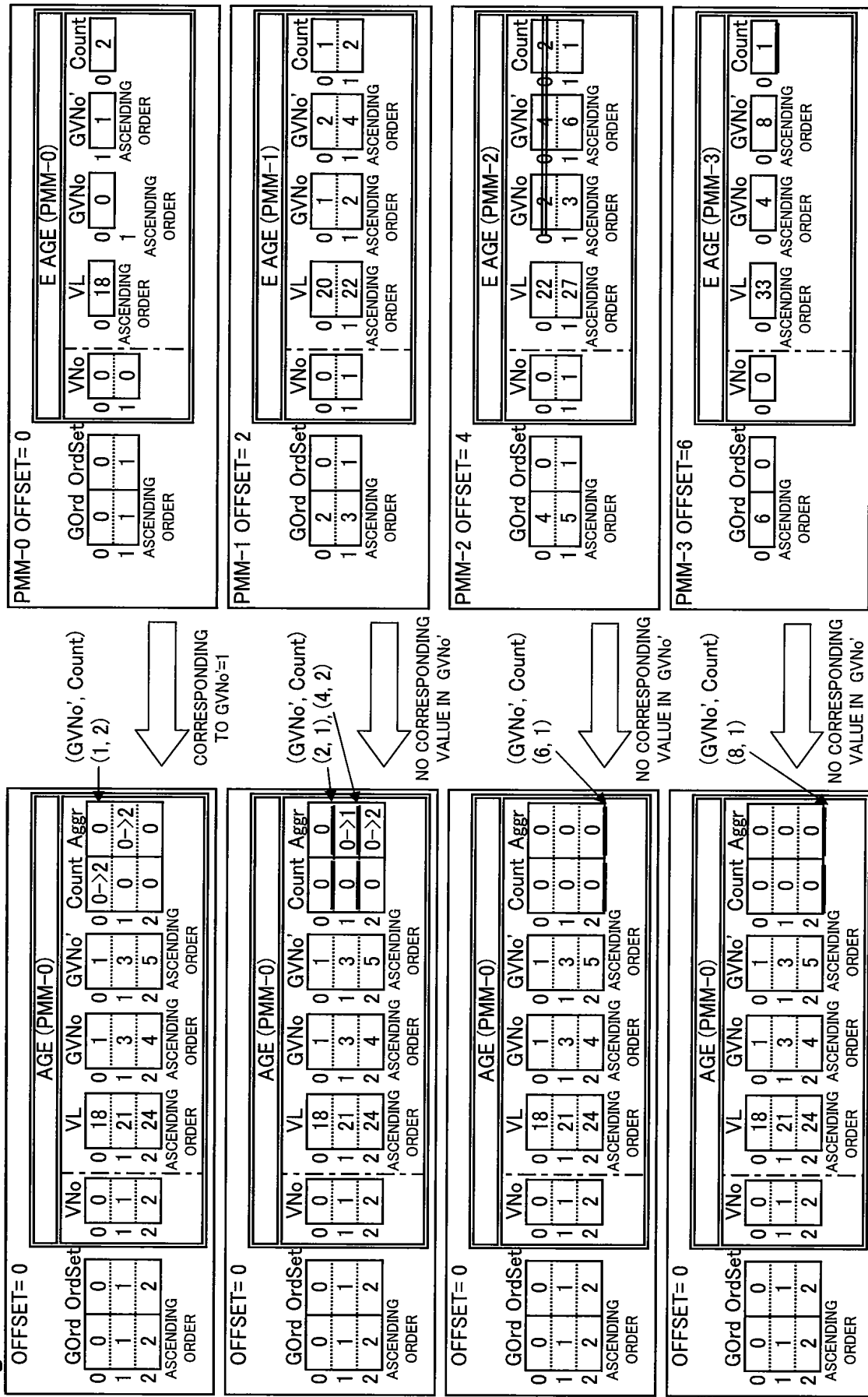


Fig.32

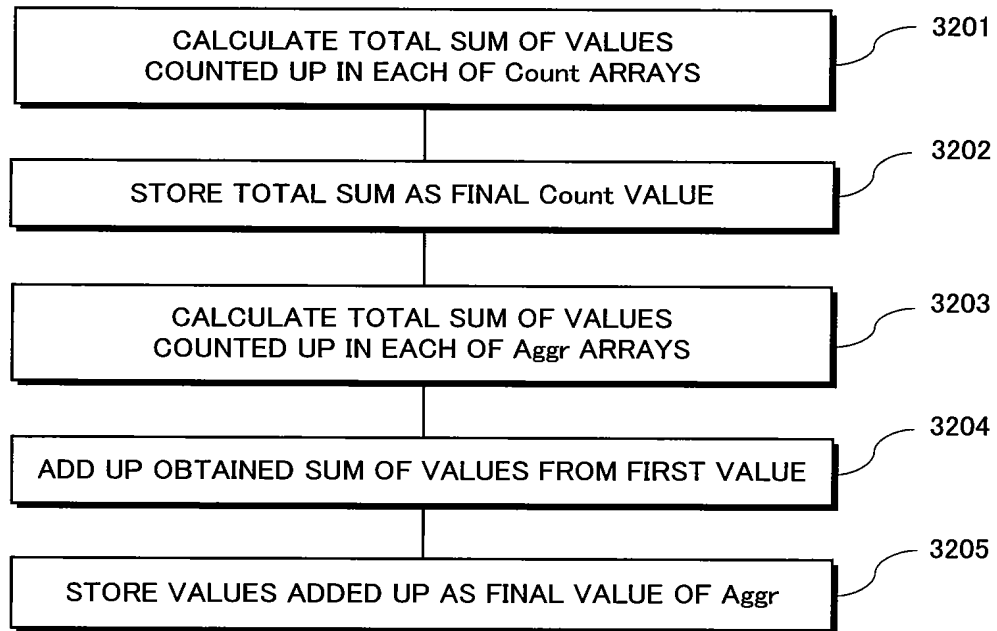


Fig.33A

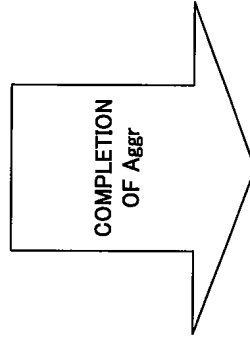
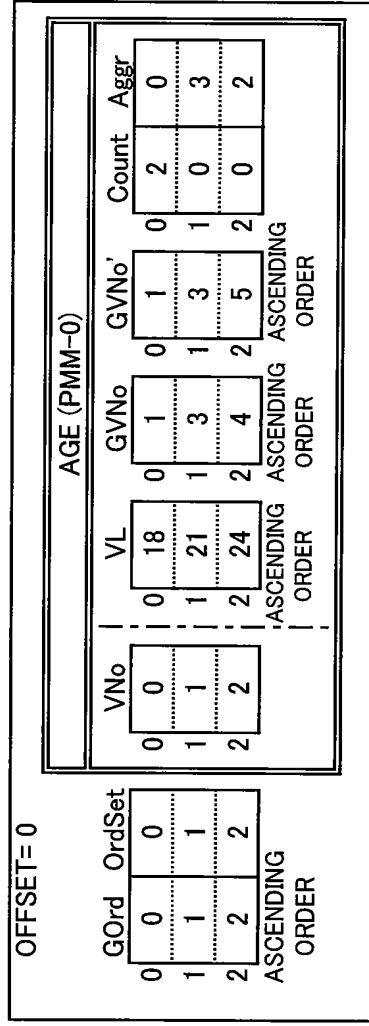


Fig.33B

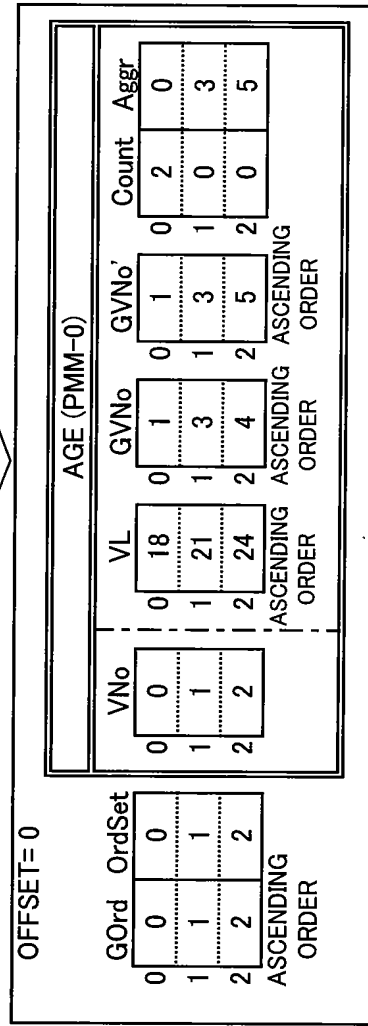


Fig.34

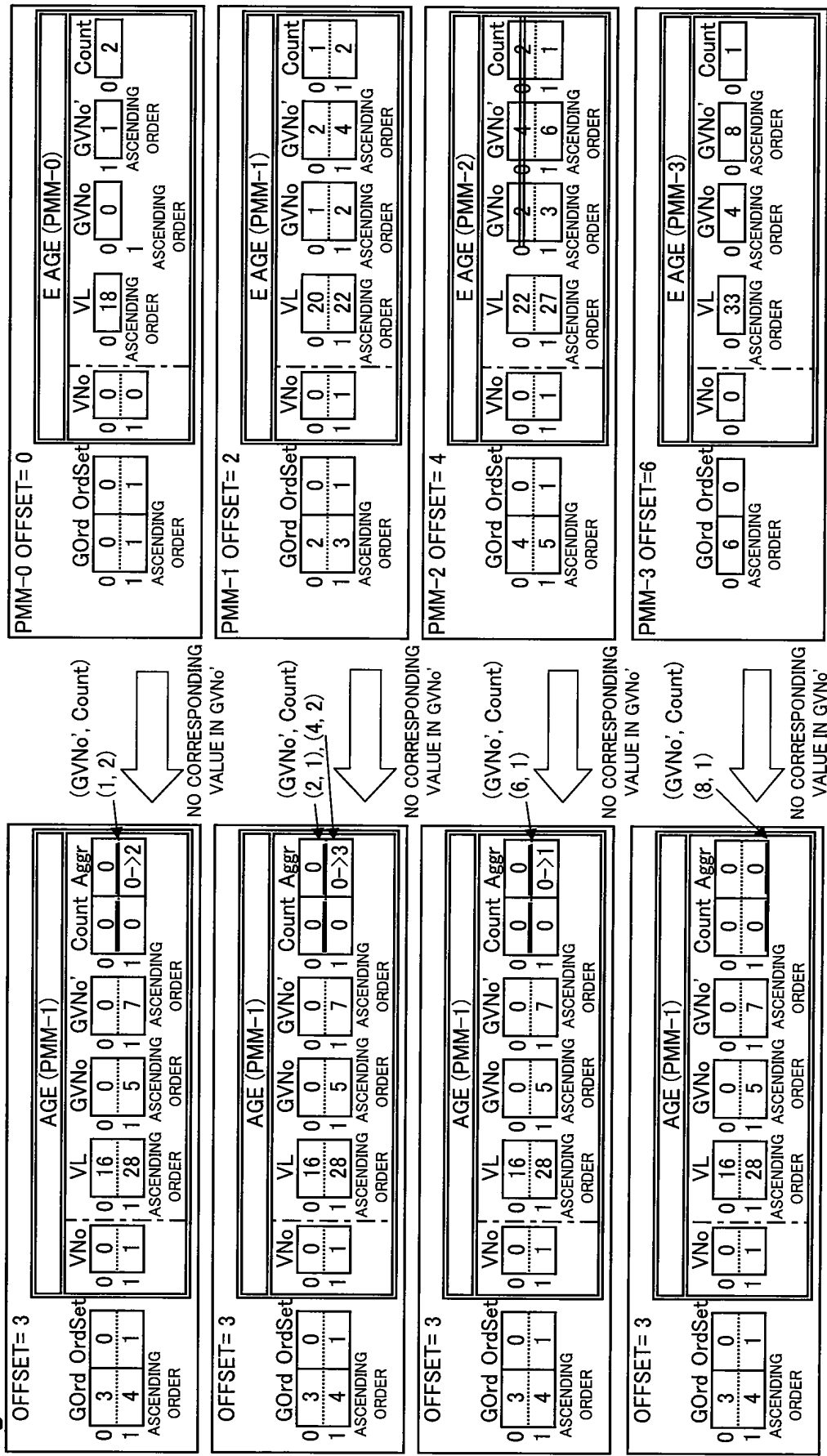


Fig.36

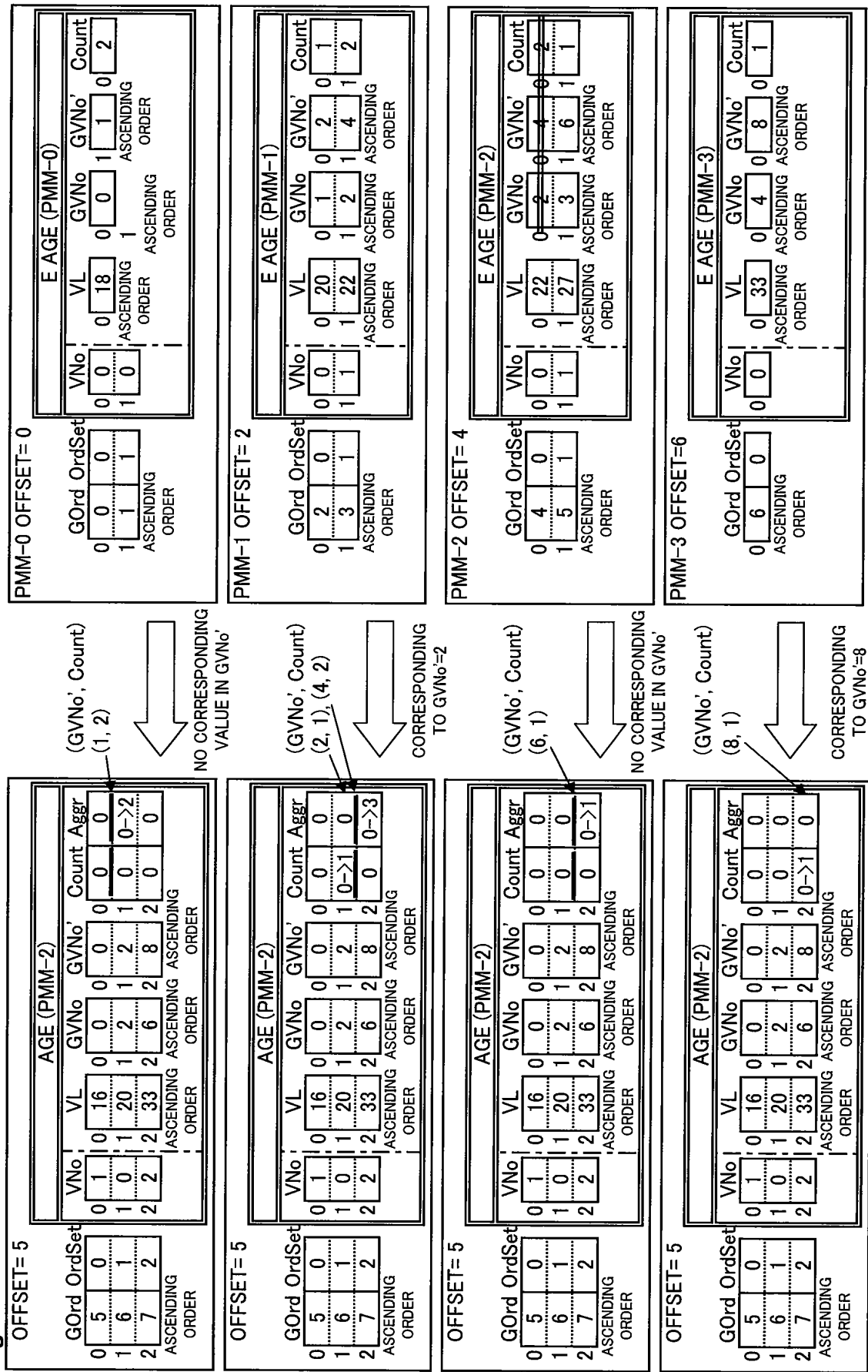


Fig.37

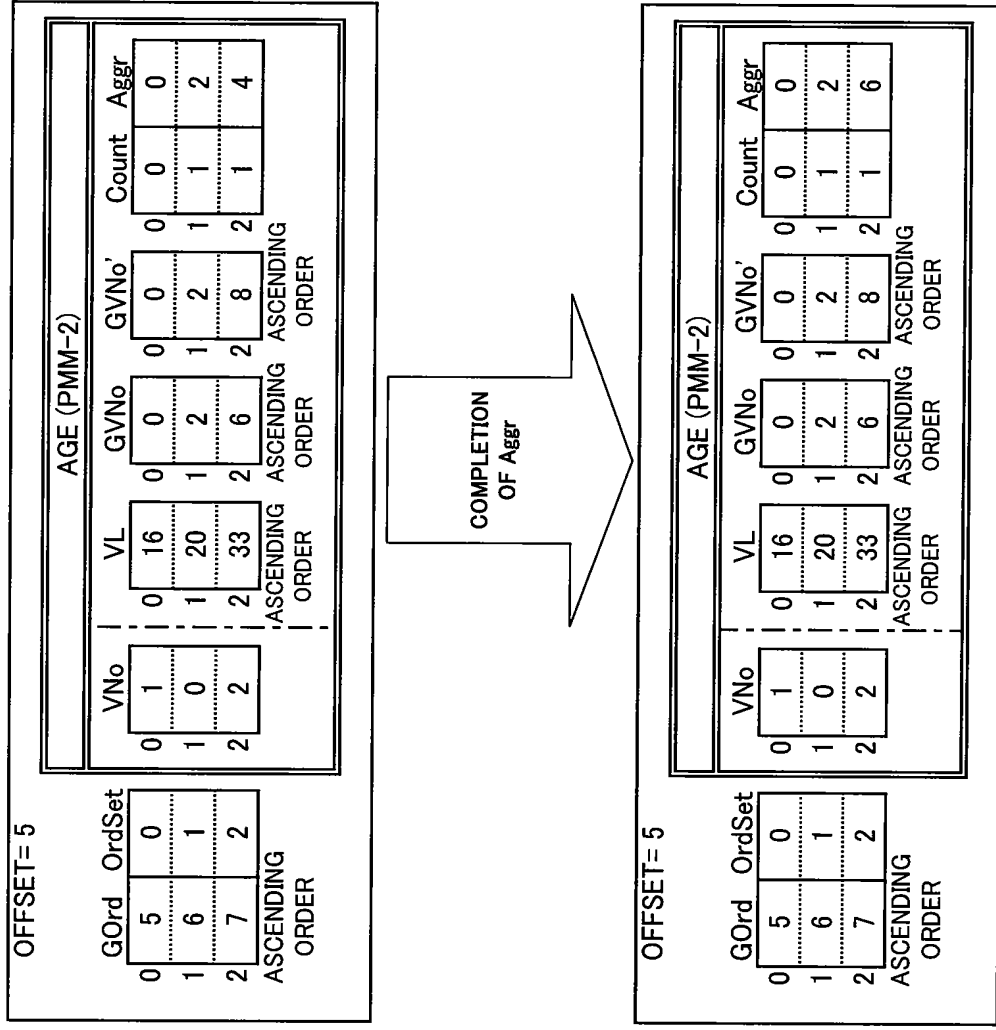


Fig.38

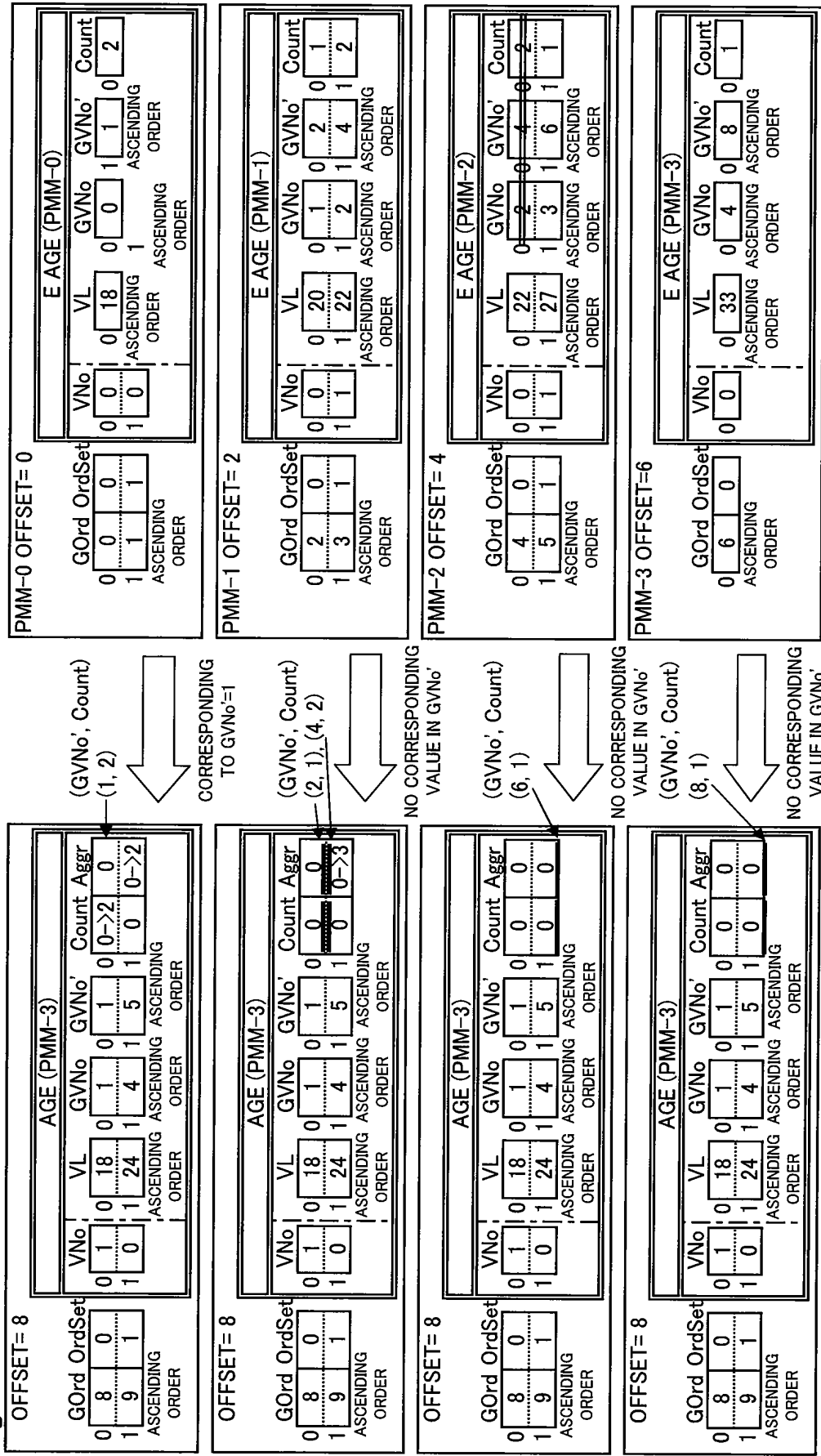


Fig.39

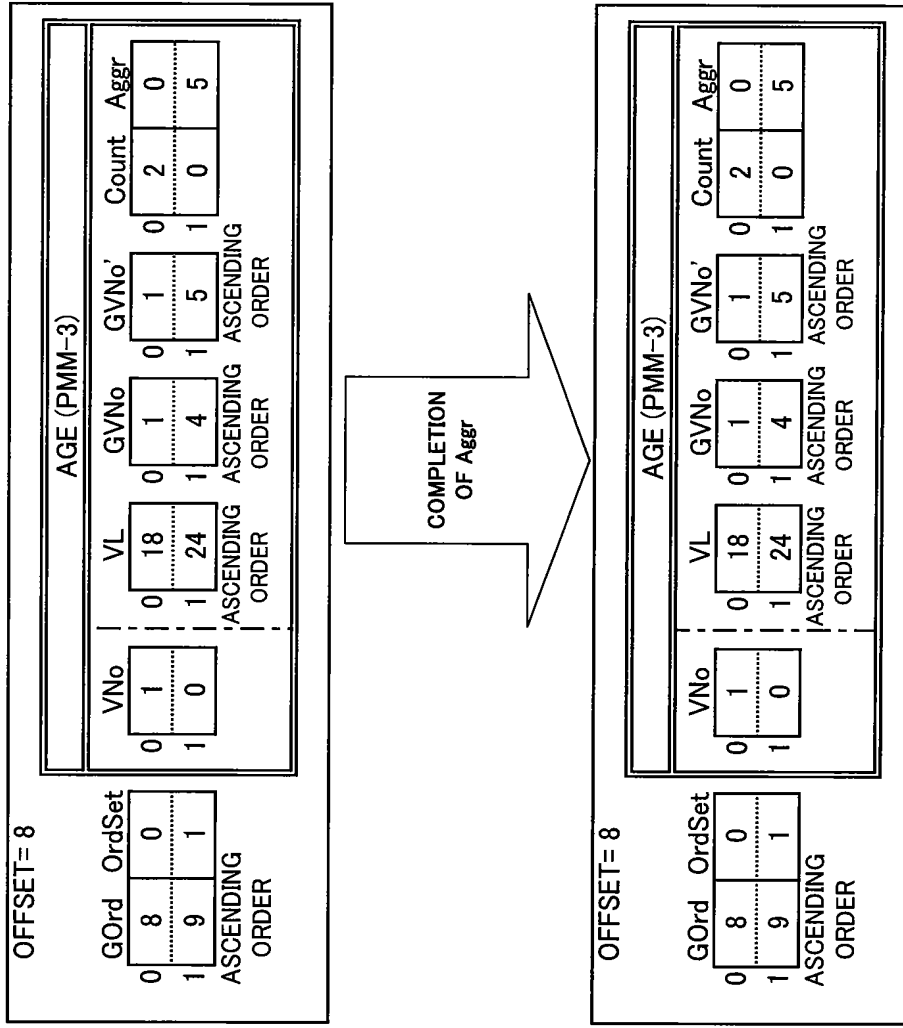


Fig.40

OFFSET= 0												
SEX (PMM-0)				AGE (PMM-0)				HEIGHT (PMM-0)		WEIGHT (PMM-0)		
SetAggr		GOrd	OrdSet	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	0	0	0	0	0	0	0	0	0	0	0	0
1	2	1	1	1	1	1	1	1	1	1	1	2
2	2	2	2	2	2	2	2	2	2	2	2	3
ASCENDING ORDER				ASCENDING ORDER				ASCENDING ORDER				

OFFSET= 3												
SEX (PMM-1)				AGE (PMM-1)				HEIGHT (PMM-1)		WEIGHT (PMM-1)		
SetAggr		GOrd	OrdSet	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	2	3	0	0	0	0	0	0	0	0	0	0
1	2	4	1	1	1	1	1	1	1	1	1	5
ASCENDING ORDER				ASCENDING ORDER				ASCENDING ORDER				

OFFSET= 5												
SEX (PMM-2)				AGE (PMM-2)				HEIGHT (PMM-2)		WEIGHT (PMM-2)		
SetAggr		GOrd	OrdSet	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	2	5	0	0	0	0	0	0	0	0	0	1
1	3	6	1	1	1	1	1	1	1	1	1	2
2	3	7	2	2	2	2	2	2	2	2	2	4
ASCENDING ORDER				ASCENDING ORDER				ASCENDING ORDER				

OFFSET= 8												
SEX (PMM-3)				AGE (PMM-3)				HEIGHT (PMM-3)		WEIGHT (PMM-3)		
SetAggr		GOrd	OrdSet	VNo	VL	GVNo	VNo	VL	GVNo	VNo	VL	GVNo
0	4	8	0	0	0	0	0	0	0	0	0	2
1	4	9	1	1	1	1	1	1	1	1	1	3
ASCENDING ORDER				ASCENDING ORDER				ASCENDING ORDER				

Fig.41

PMM-0				
	SEX	AGE	HEIGHT	WEIGHT
0	FEMALE	18	168	55
1	MALE	21	172	64
2	FEMALE	24	159	48

PMM-1				
	SEX	AGE	HEIGHT	WEIGHT
0	FEMALE	16	172	48
1	MALE	28	181	78

PMM-2				
	SEX	AGE	HEIGHT	WEIGHT
0	FEMALE	20	166	55
1	FEMALE	16	168	52
2	MALE	33	174	65

PMM-3				
	SEX	AGE	HEIGHT	WEIGHT
0	MALE	24	177	64
1	FEMALE	18	170	55

Fig.43

PMM-0		OFFSET = 0	
		E AGE	EVENT
0		18	H2
1		18	C1

PMM-1		OFFSET = 2	
		E AGE	EVENT
0		20	A
1		22	C2

PMM-2		OFFSET = 4	
		E AGE	EVENT
0		22	P1
1		27	P2

PMM-3		OFFSET = 6	
		E AGE	EVENT
0		33	M

Fig.44

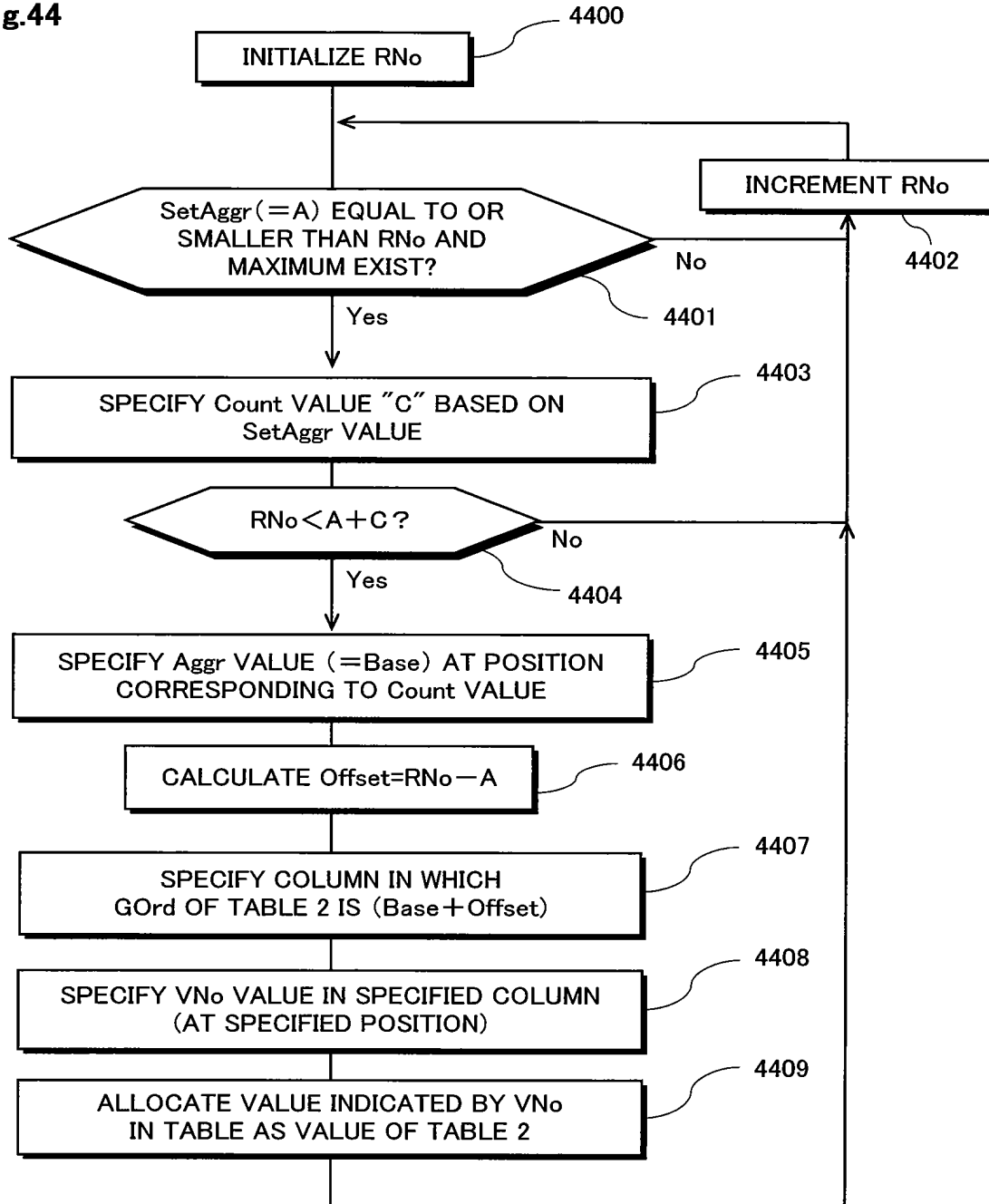


Fig. 45

4401(yes)

TABLE 1

OFFSET=0

SetAggr GOrd OrdSet

0	0	0	0
1	2	1	1
2	2	2	2

ASCENDING ORDER

AGE (PMM-0)

VN0	VL	GVNo	GVNo Count	Aggr
0	18	0	1	2
1	21	1	3	0
2	24	2	4	5

ASCENDING ORDER

4401(No)

TABLE 2

4401(yes)

GOrd OrdSet

0	0	0
1	1	1

ASCENDING ORDER

E AGE (PMM-0)

VN0	VL	GVNo	GVNo Count
0	18	0	0
1	21	1	1

ASCENDING ORDER

4401(No)

TABLE 1

OFFSET=3

SetAggr GOrd OrdSet

0	2	3	0
1	2	4	1

ASCENDING ORDER

AGE (PMM-1)

VN0	VL	GVNo	GVNo Count	Aggr
0	16	0	0	0
1	28	1	5	7

ASCENDING ORDER

4401(No)

TABLE 2

OFFSET=5

GOrd OrdSet

0	2	0
1	3	1

ASCENDING ORDER

E AGE (PMM-2)

VN0	VL	GVNo	GVNo Count
0	16	0	0
1	20	1	2

ASCENDING ORDER

4401(No)

TABLE 1

OFFSET=8

SetAggr GOrd OrdSet

0	4	8	0
1	4	9	1

ASCENDING ORDER

AGE (PMM-3)

VN0	VL	GVNo	GVNo Count	Aggr
0	18	0	1	2
1	24	1	4	5

ASCENDING ORDER

4401(No)

Fig.46

4401(Yes)

TABLE 1

OFFSET=0

AGE (PMM-0)									
SetAggr	GOrd	OrdSet	VNo	VL	GVNo	GVNo	Count	Aggr	
0	0	0	0	18	0	1	2	0	
1	2	1	1	21	1	3	0	3	
2	2	2	2	24	2	4	5	0	5
		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

4407

4401(No)

OFFSET=3

AGE (PMM-1)									
SetAggr	GOrd	OrdSet	VNo	VL	GVNo	GVNo	Count	Aggr	
0	2	3	0	16	0	0	0	0	
1	2	4	1	28	1	5	7	0	6
		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

4401(No)

OFFSET=5

AGE (PMM-2)									
SetAggr	GOrd	OrdSet	VNo	VL	GVNo	GVNo	Count	Aggr	
0	2	5	0	16	0	0	0	0	
1	3	6	1	20	1	2	1	2	
2	3	7	2	33	2	6	8	1	6
		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

4401(No)

OFFSET=8

AGE (PMM-3)									
SetAggr	GOrd	OrdSet	VNo	VL	GVNo	GVNo	Count	Aggr	
0	4	8	0	18	0	1	1	2	0
1	4	9	1	24	1	4	5	0	0
		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

TABLE 2

E AGE (PMM-0)									
GOrd	OrdSet	VNo	VL	GVNo	GVNo	Count			
0	0	0	18	0	0	1	2		
1	1	1	21	1	3	0	3		
	ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		

E AGE (PMM-1)									
GOrd	OrdSet	VNo	VL	GVNo	GVNo	Count			
0	2	0	20	0	1	2	1		
1	3	1	22	1	2	4	1		
	ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		

E AGE (PMM-2)									
GOrd	OrdSet	VNo	VL	GVNo	GVNo	Count			
0	4	0	22	0	2	4	1		
1	5	1	27	1	3	6	1		
	ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		

E AGE (PMM-3)									
GOrd	OrdSet	VNo	VL	GVNo	GVNo	Count			
0	6	0	33	0	4	8	1		
	ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		

TABLE 1

OFFSET=0

E AGE (PMM-0)											
GOrd OrdSet				VNo	VL	GVNo GVNo Count					
0	0	0	0	0	0	18	0	0	1	2	
1	1	1	1	0	ASCENDING	1	ORDER	ASCENDING	ORDER		

2	2	2	2
---	---	---	---

OFFSET=3

E AGE (PMM-1)											
GOrd		OrdSet		VNo		VL		GVNo		GVNo Count	
0	2	0		0	0	20		0	1	2	1
1	3	1		1	1	22		1	2	4	1
ASCENDING ORDER				ASCENDING ORDER				ASCENDING ORDER			

1	4	2	1
---	---	---	---

OFFSET=5

E AGE (PMM-2)									
GOrd OrdSet		VN0		VL		GVN0		Count	
0	4	0	0	0	22	0	2	4	1
1	5	1	1	1	27	1	3	6	1
ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

ORDER ORDER

OFFSET=8

E AGE (PMM-3)									
GVNo		VL		GVNo		GVNo		Count	
0	0	0	33	0	4	8	1		
ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

Fig.49

TABLE 1

4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)	4404(Yes)
4401(Yes)	4404(No)	4401(Yes)	4404(No)	4401(Yes)			

TABLE 2

E AGE (PMM-0)				
GVNo	VL	GVNo	GVNo'Count	
0	0	0	0	2
1	18	1	1	1
ASCENDING ORDER				

E AGE (PMM-1)				
GVNo	VL	GVNo	GVNo'Count	
0	0	0	1	2
1	20	1	2	4
2	22	1	4	1
ASCENDING ORDER				

E AGE (PMM-2)				
GVNo	VL	GVNo	GVNo'Count	
0	0	0	2	4
1	22	1	3	6
2	27	1	6	1
ASCENDING ORDER				

E AGE (PMM-3)				
GVNo	VL	GVNo	GVNo'Count	
0	0	0	4	8
1	33	0	8	1
2	33	1	1	1
ASCENDING ORDER				

TABLE 1

OFFSET=0

Figure 1 illustrates the EAGE (PMM-0) algorithm. It shows three data structures: GOrd OrdSet, VNo, and GVNo GVNo Count. The GOrd OrdSet contains the values [0, 0, 0, 1, 1] with an arrow pointing to the first '1'. The VNo contains the values [0, 0, 0, 1, 1] with an arrow pointing to the first '1'. The GVNo GVNo Count contains the values [0, 0, 0, 1, 2] with an arrow pointing to the first '1'. Labels 'ASCENDING ORDER' are placed below each structure.

2

OFFSET=3

E AGE (PMM-1)			
GOrd OrdSet		VNo :	
0	2	0	0
1	3	1	1
ASCENDING ORDER		VL	
		20	0
		22	1
		GVNo GVNo' Count	
		1	2
		2	4
		ASCENDING ORDER	

4

OFFSET=5

E AGE (PMM-2)									
GOrd OrdSet		VN0		VL		GVNo		GVNo Count	
0	4	0	0	0	22	0	2	4	1
1	5	1	1	1	27	1	3	6	1
ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

2

OFFSET=8

E AGE (PMM-3)									
GOrd		OrdSet		VN ₀		VL		GVNoGVNo' Count	
0	6	0	0	0	0	33	0	4	8
ASCENDING ORDER				ASCENDING ORDER				ASCENDING ORDER	

ORDER

TABLE 2

The diagram illustrates the PMM-0 structure, which is organized into four main sections: GOrd OrdSet, VNo, VL, and GVNo'Count. Each section contains a sequence of values, with arrows indicating an ascending order.

- GOrd OrdSet:** Contains the values 0, 0, 0, 1, 1, 1. An arrow points to the first '1' with the label "ASCENDING ORDER".
- VNo:** Contains the values 0, 0, 0, 1. An arrow points to the first '1' with the label "ASCENDING ORDER".
- VL:** Contains the values 0, 18, 0, 0, 0, 1, 2. An arrow points to the first '0' with the label "ASCENDING ORDER".
- GVNo'Count:** Contains the values 0, 0, 1, 2. An arrow points to the first '0' with the label "ASCENDING ORDER".

The entire structure is labeled "E AGE (PMM-0)" at the top.

E AGE (PMM-1)					
GOrd OrdSet		VNo :	VL	GVNo	GVNo Count
0	2	0	0	20	0
1	3	1	1	22	1

		'ASCENDING ASCENDING ASCENDING			
		ORDER	ORDER	ORDER	ORDER

E AGE (PMM-2)										
GOrd		OrdSet		VNo	VL	GVNo		GVNo		Count
0	4	0	0	0	22	0	2	4	1	
1	5	1	1	1	27	1	3	6	1	
ASCENDING				ASCENDING		ASCENDING		ASCENDING		
ORDER				ORDER		ORDER		ORDER		

E AGE (PMM-3)									
GOrd		OrdSet		VNo	VL	GVNo	GVNo	Count	
0	6	0	0	0	33	0	4	8	1
ASCENDING				ASCENDING ASCENDING					
ORDER				ORDER ORDER					

Fig.51A

● RECORD OF JOIN TABLE = 0

0	TABLE 1				0	TABLE 2	
	SEX	AGE	HEIGHT	WEIGHT		E AGE	EVENT
	FEMALE	18	168	55		18	H2

Fig.51B

● RECORD OF JOIN TABLE = 1

0	TABLE 1				1	TABLE 2	
	SEX	AGE	HEIGHT	WEIGHT		E AGE	EVENT
	FEMALE	18	168	55		18	C1

Fig.51C

● RECORD OF JOIN TABLE = 2

5	TABLE 1				2	TABLE 2	
	SEX	AGE	HEIGHT	WEIGHT		E AGE	EVENT
	FEMALE	20	166	55		20	A

Fig.51D

● RECORD OF JOIN TABLE = 3

7	TABLE 1				6	TABLE 2	
	SEX	AGE	HEIGHT	WEIGHT		E AGE	EVENT
	MALE	33	174	65		33	M

Fig.51E

● RECORD OF JOIN TABLE = 4

9	TABLE 1				0	TABLE 2	
	SEX	AGE	HEIGHT	WEIGHT		E AGE	EVENT
	FEMALE	18	170	55		18	H2

Fig.51F

● RECORD OF JOIN TABLE = 5

9	TABLE 1				1	TABLE 2	
	SEX	AGE	HEIGHT	WEIGHT		E AGE	EVENT
	FEMALE	18	170	55		18	C1

Fig.52

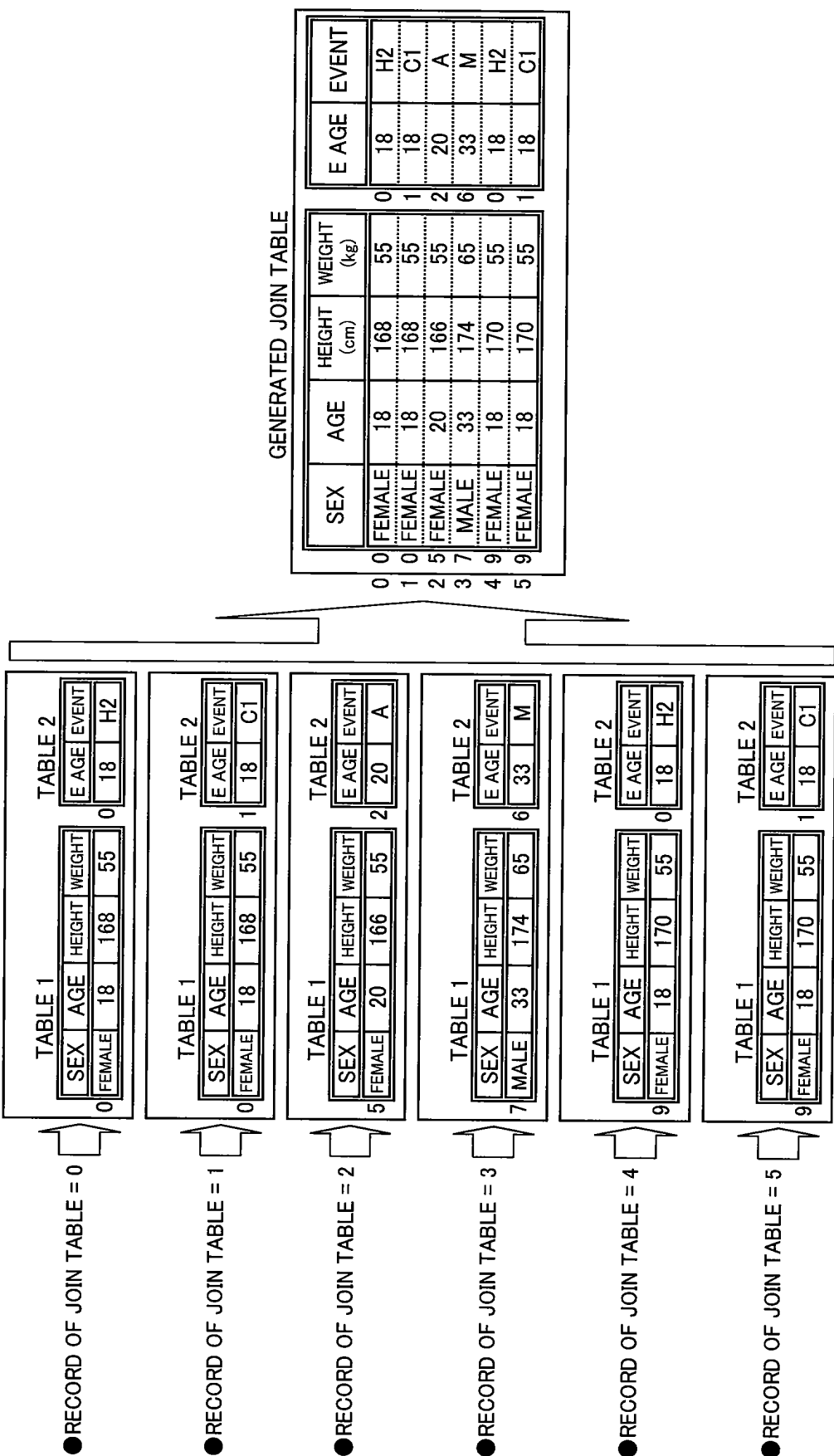


Fig.53

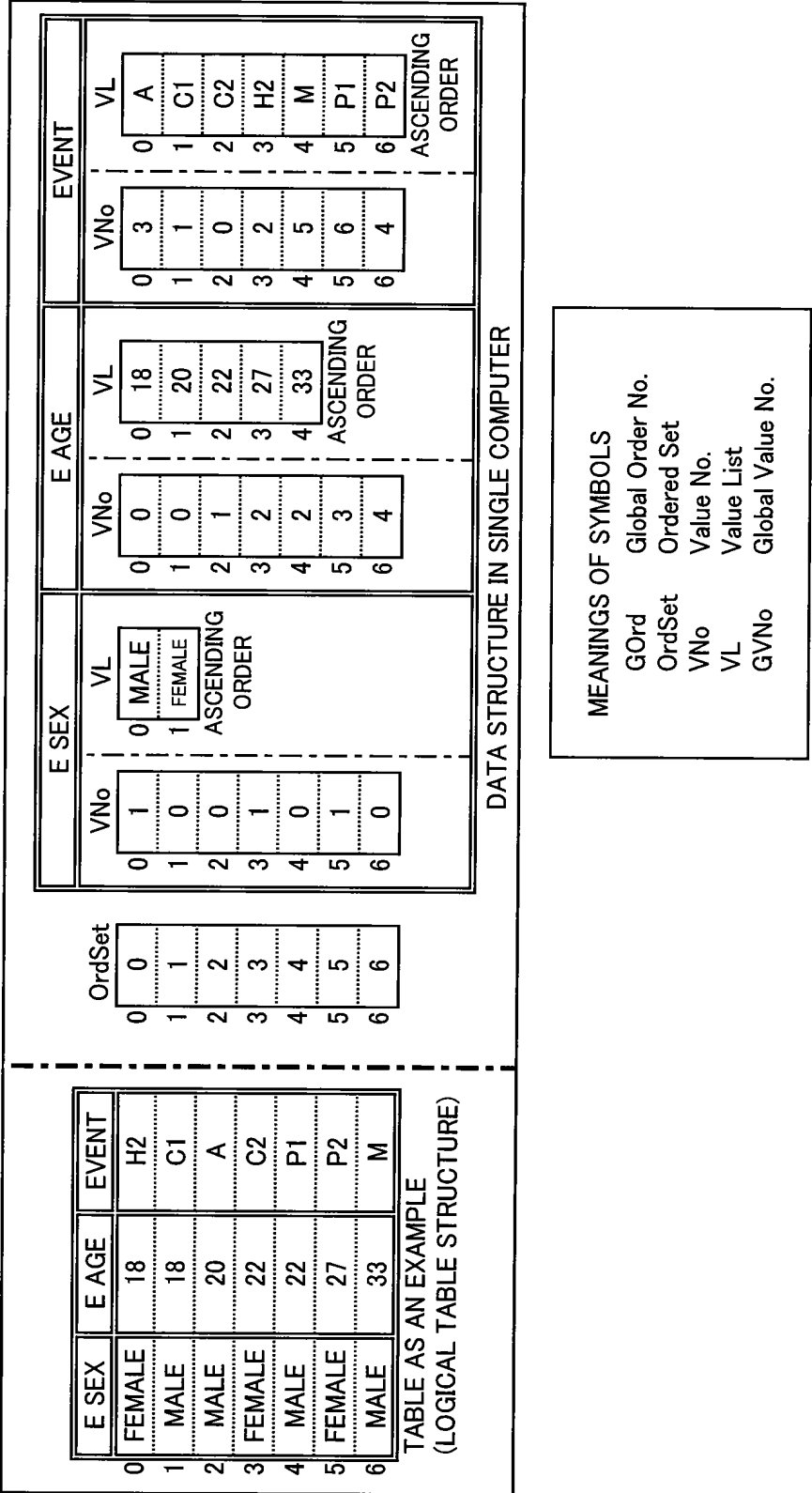


Fig.54

PMM-0		OFFSET = 0		
	E SEX	E AGE	EVENT	
0	FEMALE	18	H2	
1	MALE	18	C1	

PMM-1		OFFSET = 2		
	E SEX	E AGE	EVENT	
0	MALE	20	A	
1	FEMALE	22	C2	

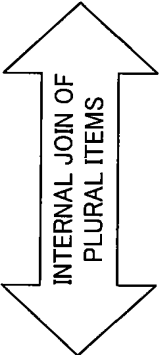
PMM-2		OFFSET = 4		
	E SEX	E AGE	EVENT	
0	MALE	22	P1	
1	FEMALE	27	P2	

PMM-3		OFFSET = 6		
	E SEX	E AGE	EVENT	
0	MALE	33	M	

Fig.56

TABLE 1

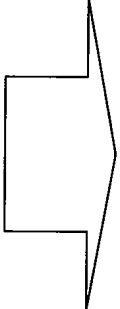
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	18	168	55
1	MALE	21	172	64
2	FEMALE	24	159	48
3	FEMALE	16	172	48
4	MALE	28	181	78
5	FEMALE	20	166	55
6	FEMALE	16	168	52
7	MALE	33	174	65
8	MALE	24	177	64
9	FEMALE	18	170	55



$SEX \cdot AGE \times E\ SEX \cdot E\ AGE$

TABLE 2

	E SEX	E AGE	EVENT
0	FEMALE	18	H2
1	MALE	18	C1
2	MALE	20	A
3	FEMALE	22	C2
4	MALE	22	P1
5	FEMALE	27	P2
6	MALE	33	M



GENERATED JOIN TABLE

	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)	E SEX	E AGE	EVENT
0	FEMALE	18	168	55	FEMALE	18	H2
1	MALE	33	174	65	MALE	33	M
2	FEMALE	18	170	55	FEMALE	18	H2

Fig.57

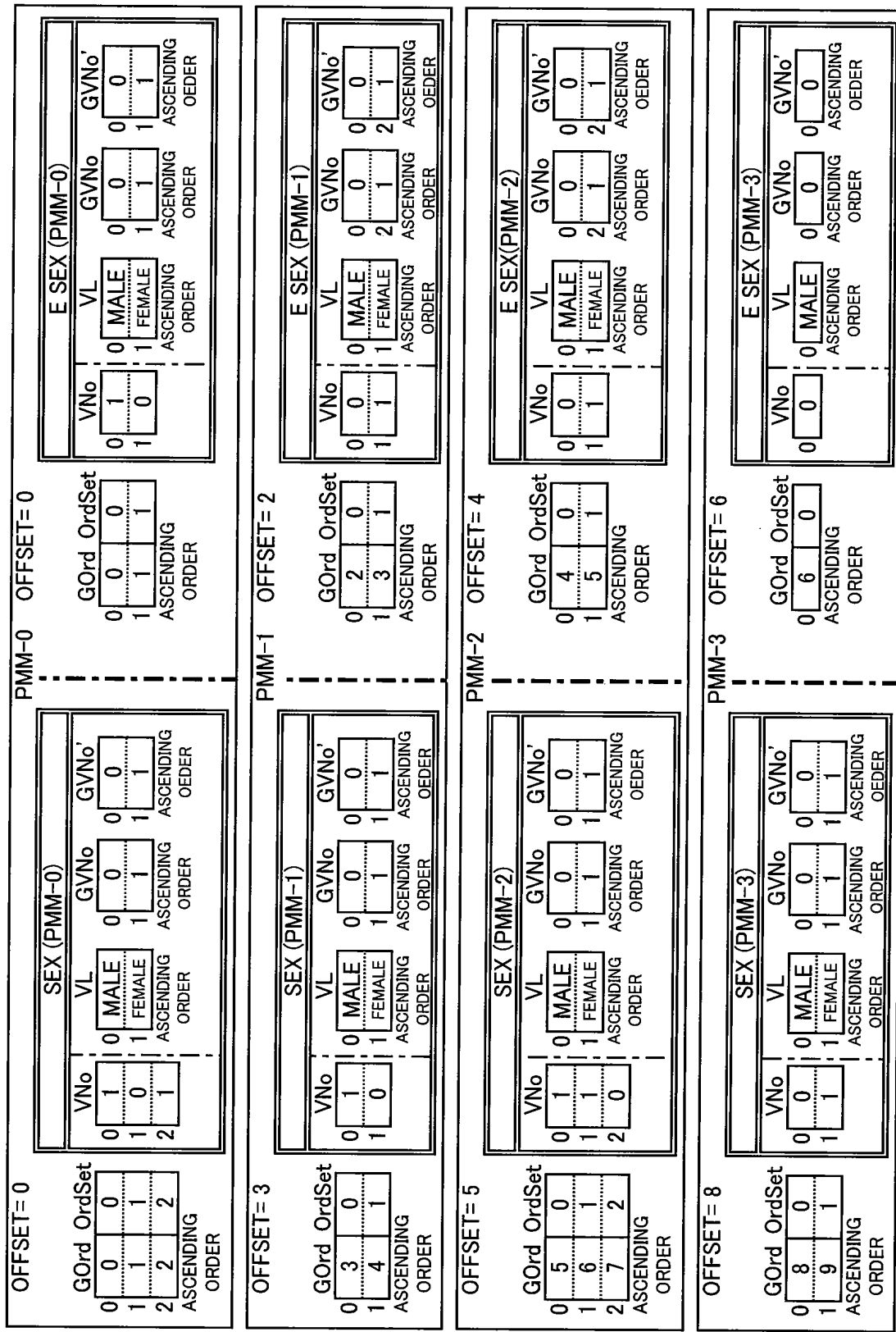


Fig.58

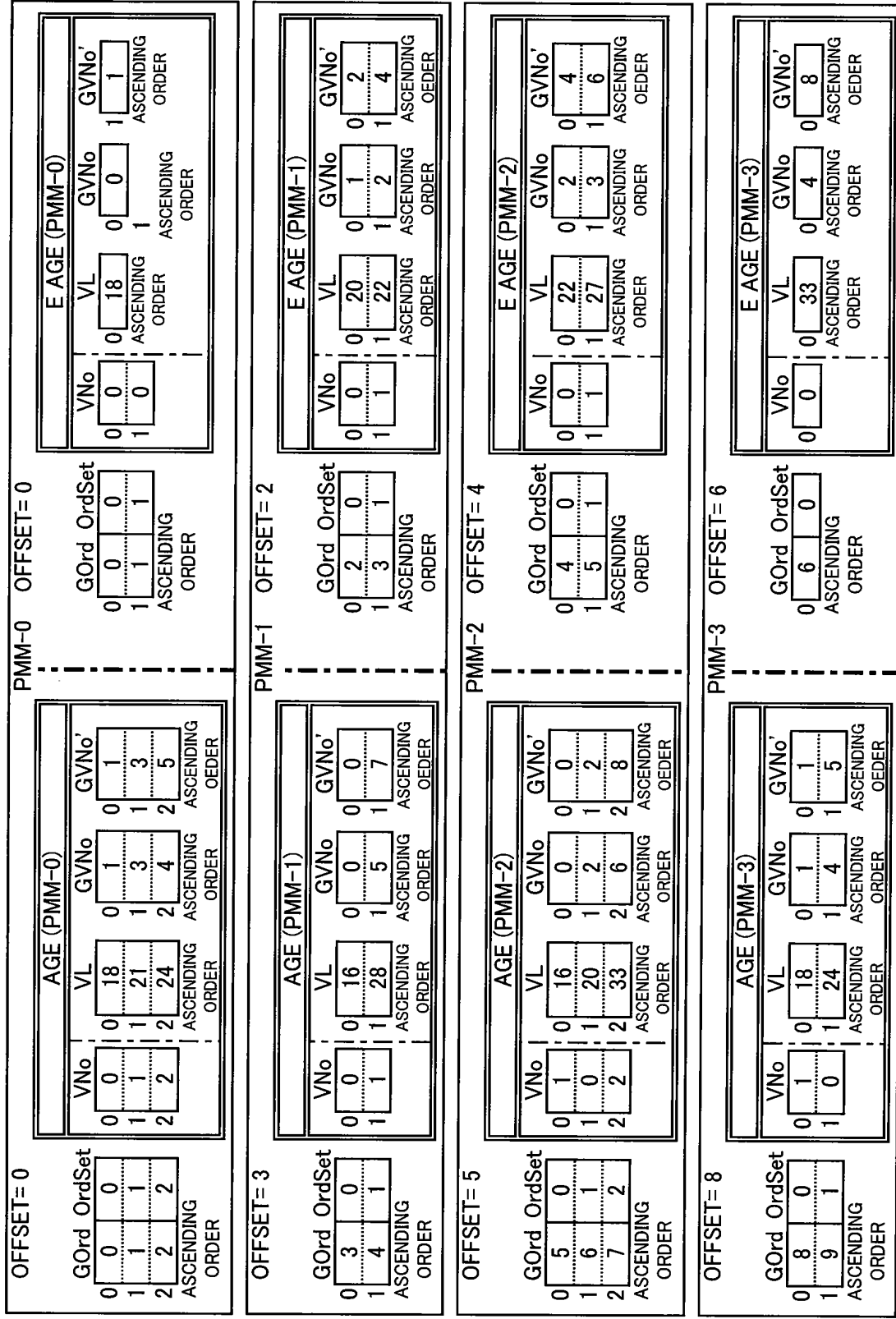


Fig.59

PMM-0		OFFSET= 0									
		SEX (PMM-0)					AGE (PMM-0)				
GOrd	OrdSet	VNo	VL	GVNo	GVNo'	VNo	VL	GVNo	GVNo'		
0	0	0	MALE	0	0	0	18	0	1		
1	1	1	FEMALE	1	1	1	21	1	3		
2	2	2				2	24	2	4		
ASCENDING ORDER							ASCENDING ORDER				
PMM-1		OFFSET= 3									
		SEX (PMM-1)					AGE (PMM-1)				
GOrd	OrdSet	VNo	VL	GVNo	GVNo'	VNo	VL	GVNo	GVNo'		
0	3	0	MALE	0	0	0	16	0	0		
1	4	1	FEMALE	1	1	1	28	1	5		
ASCENDING ORDER							ASCENDING ORDER				
PMM-2		OFFSET= 5									
		SEX (PMM-2)					AGE (PMM-2)				
GOrd	OrdSet	VNo	VL	GVNo	GVNo'	VNo	VL	GVNo	GVNo'		
0	5	0	MALE	0	0	0	16	0	0		
1	6	1	FEMALE	1	1	1	20	1	2		
2	7	2				2	33	2	6		
ASCENDING ORDER							ASCENDING ORDER				
PMM-3		OFFSET= 8									
		SEX (PMM-3)					AGE (PMM-3)				
GOrd	OrdSet	VNo	VL	GVNo	GVNo'	VNo	VL	GVNo	GVNo'		
0	8	0	MALE	0	0	0	18	0	1		
1	9	1	FEMALE	1	1	1	24	1	4		
ASCENDING ORDER							ASCENDING ORDER				

Fig.60

PMM-0

OFFSET=0		E SEX (PMM-0)				E AGE (PMM-0)			
GOrd	OrdSet	VNo	VL	GVNo	GVNo'	VNo	VL	GVNo	GVNo'
0	0	0	MALE	0	0	0	18	0	1
1	1	1	FEMALE	1	1	1	ASCENDING ORDER	1	ASCENDING ORDER

PMM-1

OFFSET=2		E SEX (PMM-1)				E AGE (PMM-1)			
GOrd	OrdSet	VNo	VL	GVNo	GVNo'	VNo	VL	GVNo	GVNo'
0	2	0	MALE	0	0	0	20	0	2
1	3	1	FEMALE	2	1	1	22	1	4

PMM-2

OFFSET=4		E SEX (PMM-2)				E AGE (PMM-2)			
GOrd	OrdSet	VNo	VL	GVNo	GVNo'	VNo	VL	GVNo	GVNo'
0	4	0	MALE	0	0	0	22	0	4
1	5	1	FEMALE	2	1	1	27	1	6

PMM-3

OFFSET=6		E SEX (PMM-3)				E AGE (PMM-3)			
GOrd	OrdSet	VNo	VL	GVNo	GVNo'	VNo	VL	GVNo	GVNo'
0	6	0	MALE	0	0	0	33	0	8
	ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER

Fig.61

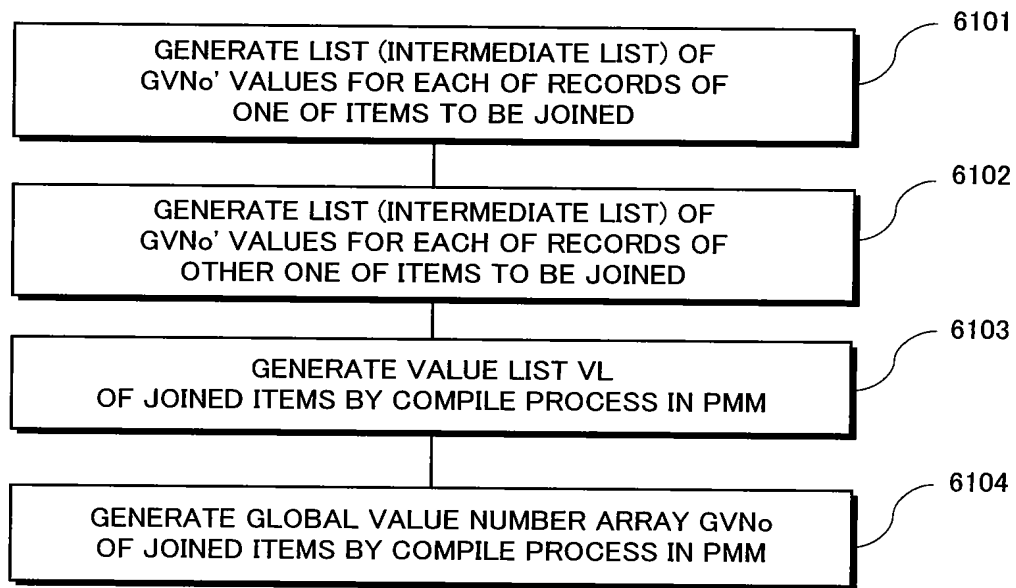


Fig.62

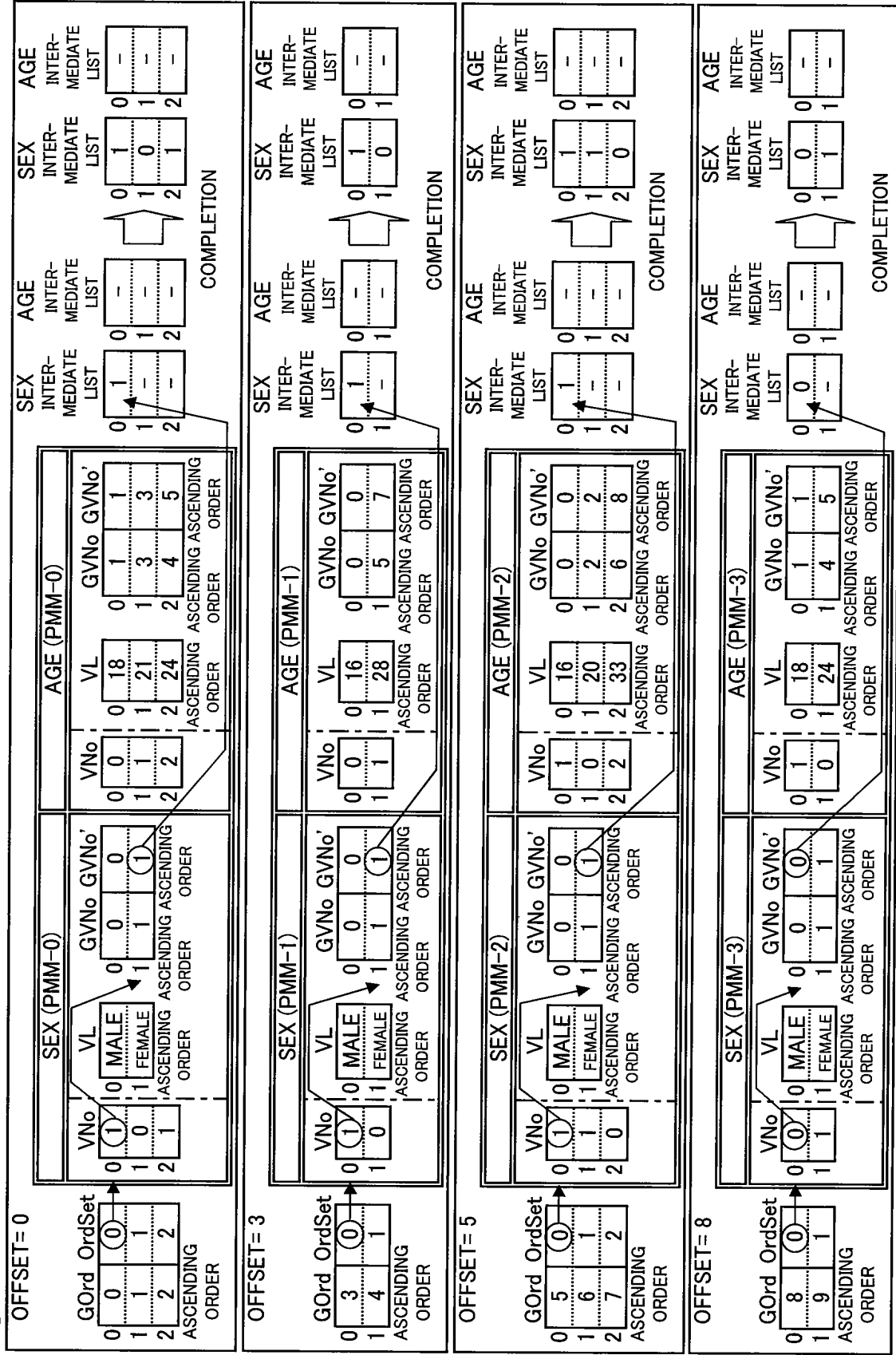


Fig.63

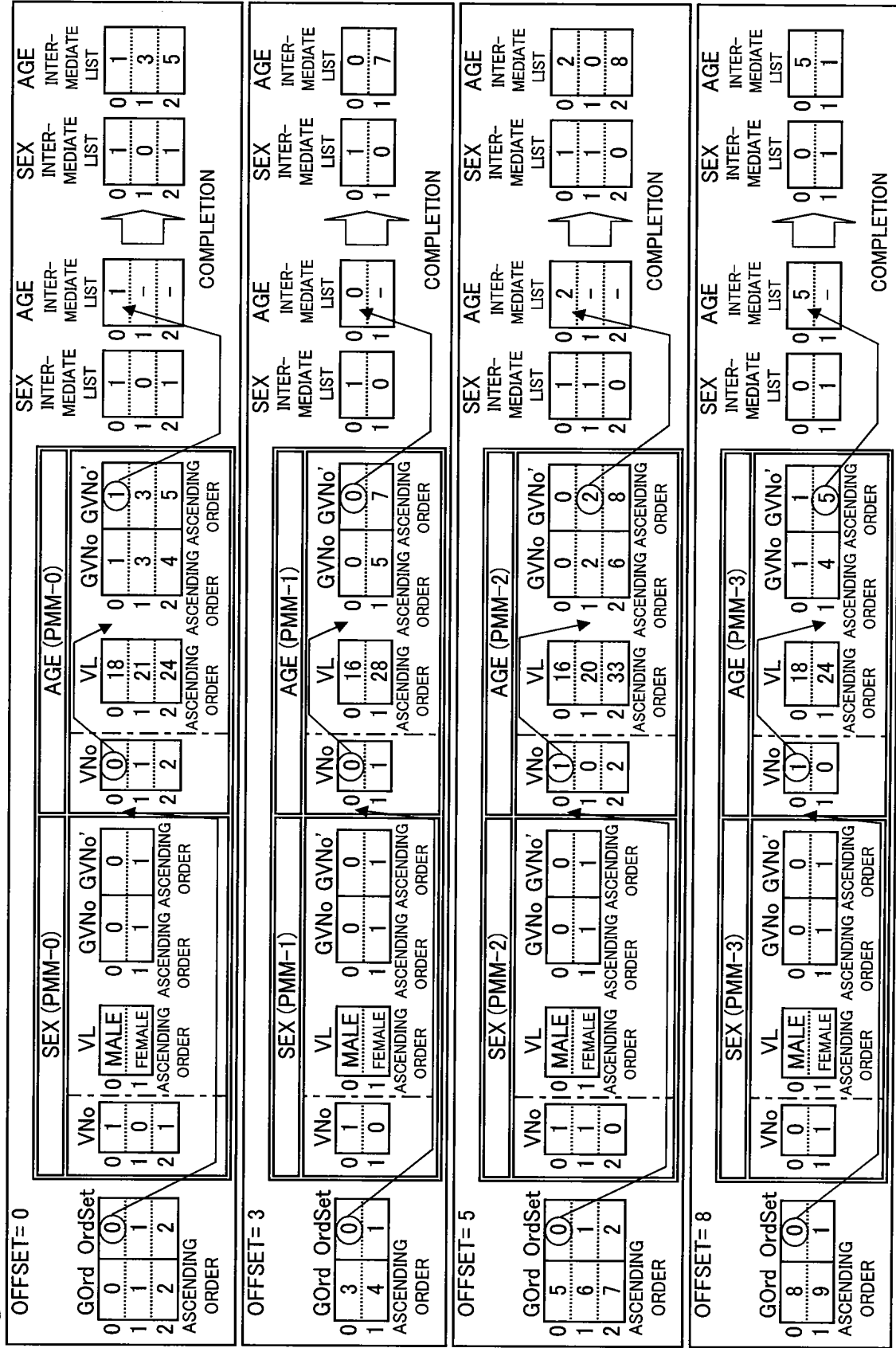


Fig.64

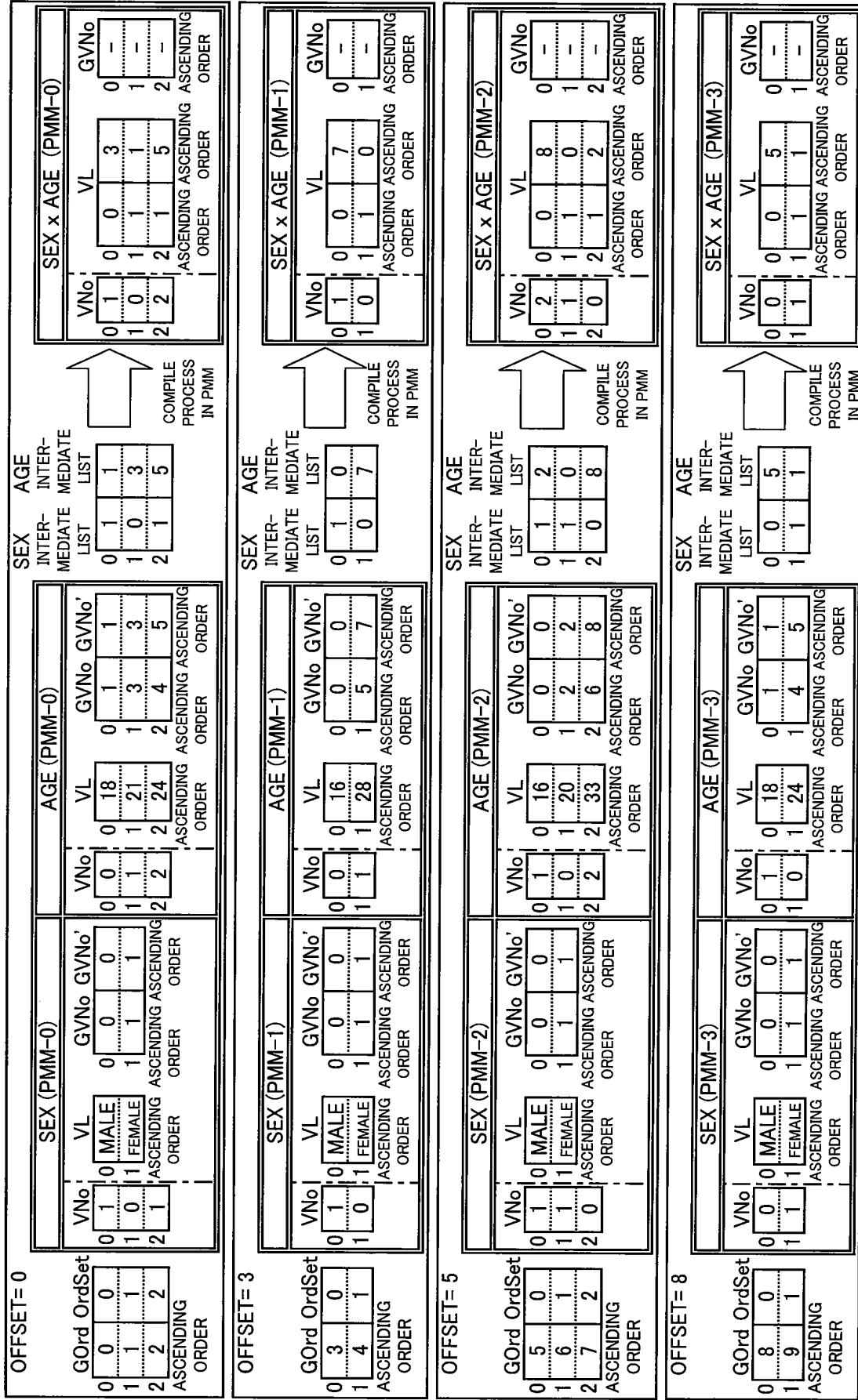


Fig.65

SEX x AGE (PMM-0)					
VNo		VL		GVNo	
0	1	0	0	3	0
1	0	1	1	1	5
2	2	2	1	5	7
		ASCENDING ORDER		ASCENDING ORDER	

SEX x AGE (PMM-1)					
VNo		VL		GVNo	
0	1	0	0	7	2
1	0	1	1	0	4
		ASCENDING ORDER		ASCENDING ORDER	

SEX x AGE (PMM-2)					
VNo		VL		GVNo	
0	2	0	0	8	3
1	1	1	1	0	4
2	0	2	1	2	6
		ASCENDING ORDER		ASCENDING ORDER	

SEX x AGE (PMM-3)					
VNo		VL		GVNo	
0	0	0	0	5	1
1	1	1	1	1	5
		ASCENDING ORDER		ASCENDING ORDER	

Fig.66

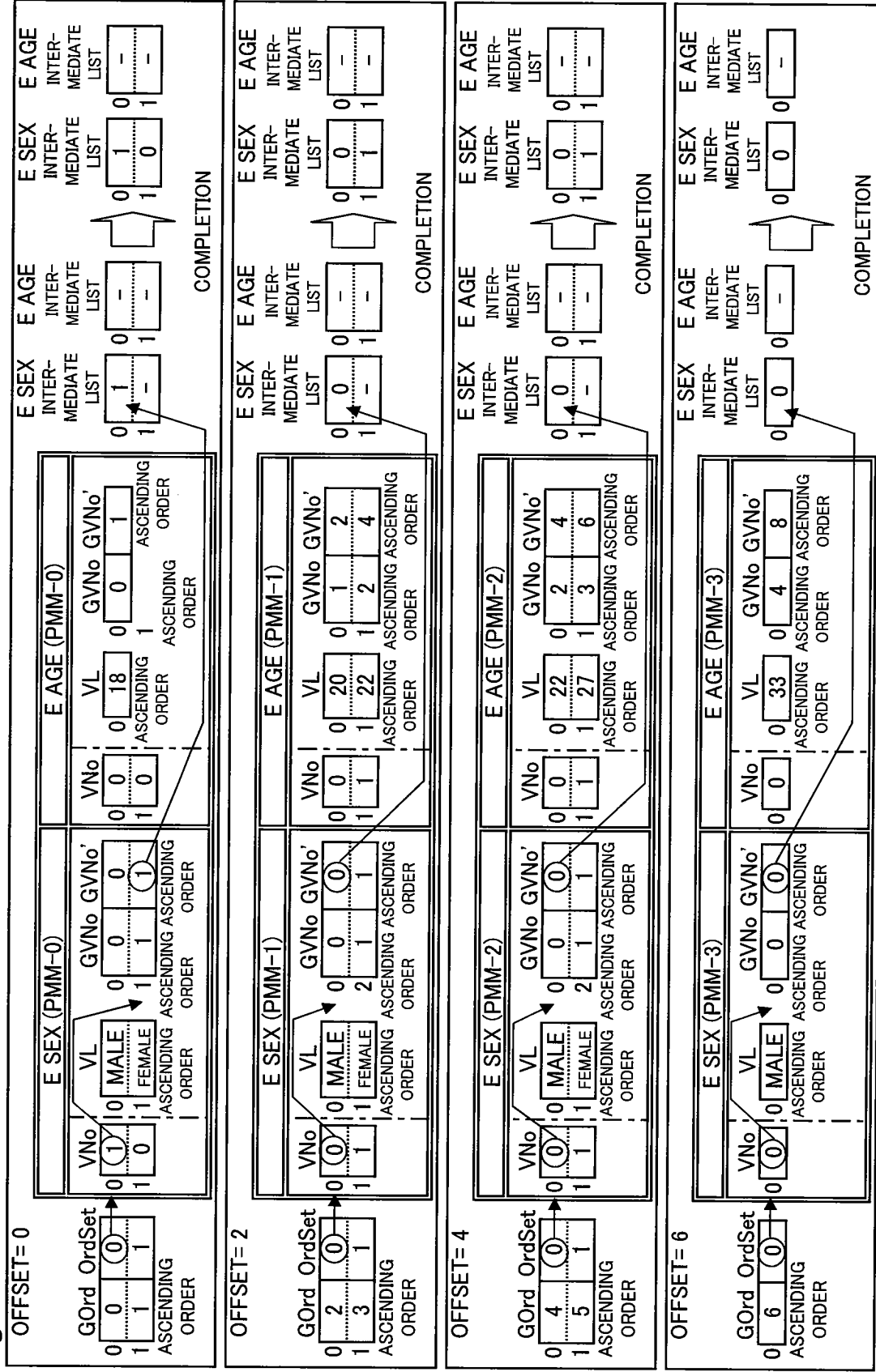


Fig.67

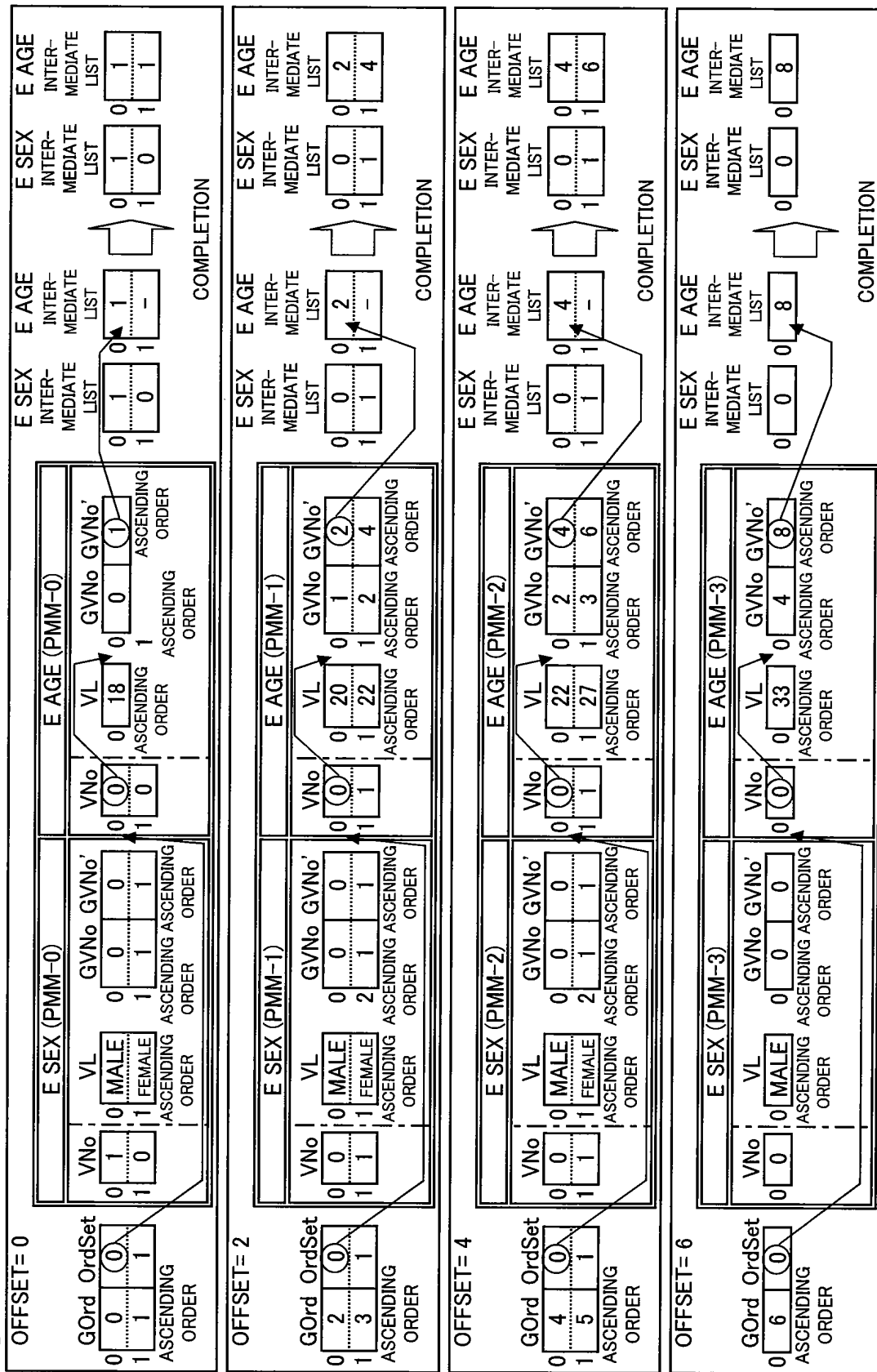


Fig.68

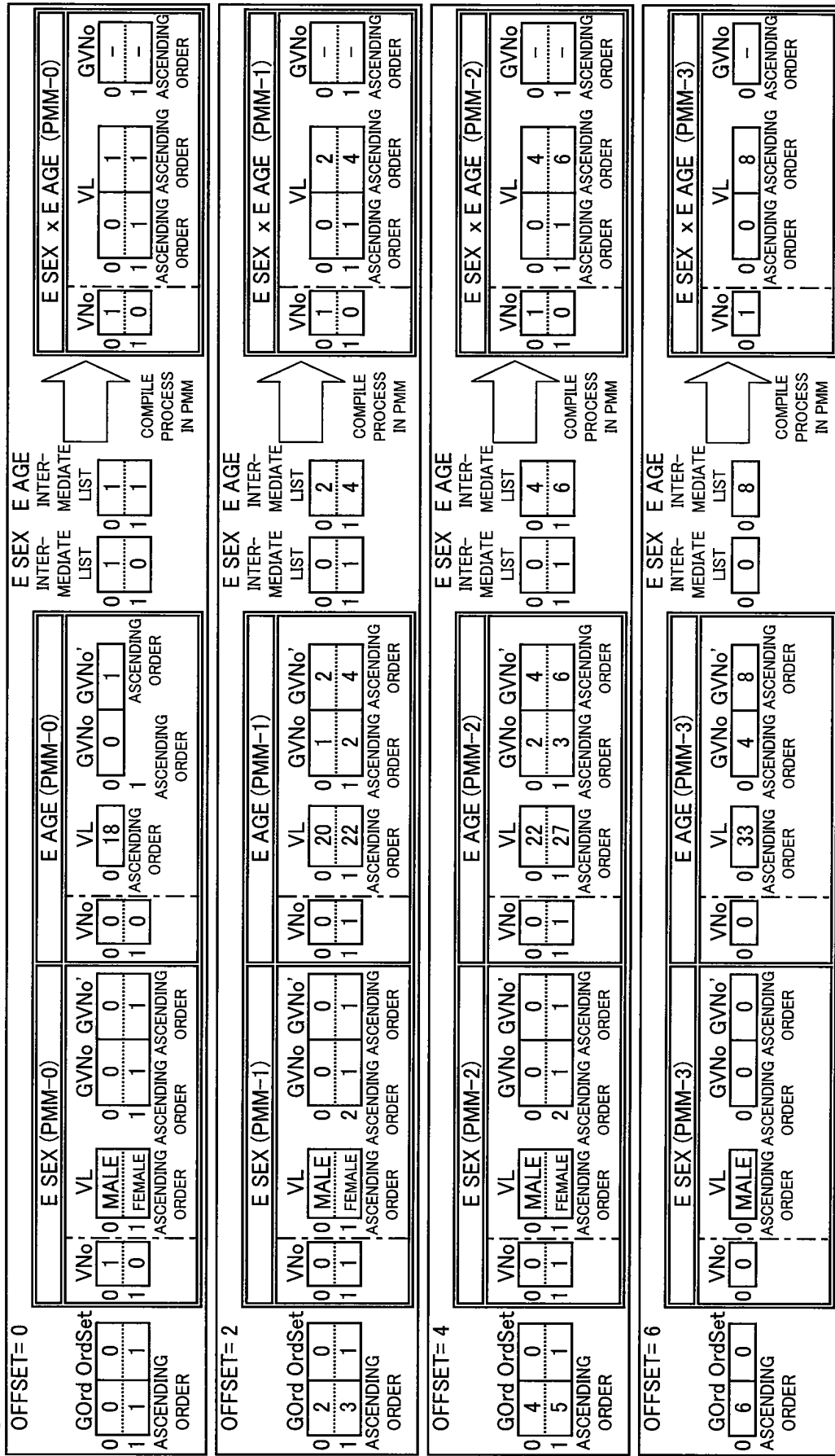


Fig.69

E SEX x E AGE (PMM-0)					
VNo		VL		GVNo	
0	1	0	1	0	0
1	0	1	1	1	4
		ASCENDING ORDER	ASCENDING ORDER	ASCENDING ORDER	

E SEX x E AGE (PMM-1)					
VNo		VL		GVNo	
0	1	0	2	0	1
1	0	1	4	1	5
		ASCENDING ORDER	ASCENDING ORDER	ASCENDING ORDER	

E SEX x E AGE (PMM-2)					
VNo		VL		GVNo	
0	1	0	4	0	2
1	0	1	6	1	6
		ASCENDING ORDER	ASCENDING ORDER	ASCENDING ORDER	

E SEX x E AGE (PMM-3)					
VNo		VL		GVNo	
0	1	0	8	0	3
		ASCENDING ORDER	ASCENDING ORDER	ASCENDING ORDER	

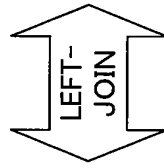
Fig.70

TABLE 1

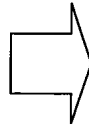
	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)
0	FEMALE	18	168	55
1	MALE	21	172	64
2	FEMALE	24	159	48
3	FEMALE	16	172	48
4	MALE	28	181	78
5	FEMALE	20	166	55
6	FEMALE	16	168	52
7	MALE	33	174	65
8	MALE	24	177	64
9	FEMALE	18	170	55

TABLE 2

	E AGE	EVENT
0	18	H2
1	18	C1
2	20	A
3	22	C2
4	22	P1
5	27	P2
6	33	M



AGE x E AGE



GENERATED JOIN TABLE

	SEX	AGE	HEIGHT(cm)	WEIGHT(kg)	E AGE	EVENT
0	FEMALE	18	168	55	18	H2
1	FEMALE	18	168	55	18	C1
2	MALE	21	172	64	-	-
3	FEMALE	24	159	48	-	-
4	FEMALE	16	172	48	-	-
5	MALE	28	181	78	-	-
6	FEMALE	20	166	55	20	A
7	FEMALE	16	168	52	-	-
8	MALE	33	174	65	33	M
9	MALE	24	177	64	-	-
10	FEMALE	18	170	55	18	H2
11	FEMALE	18	170	55	18	C1

Fig.71

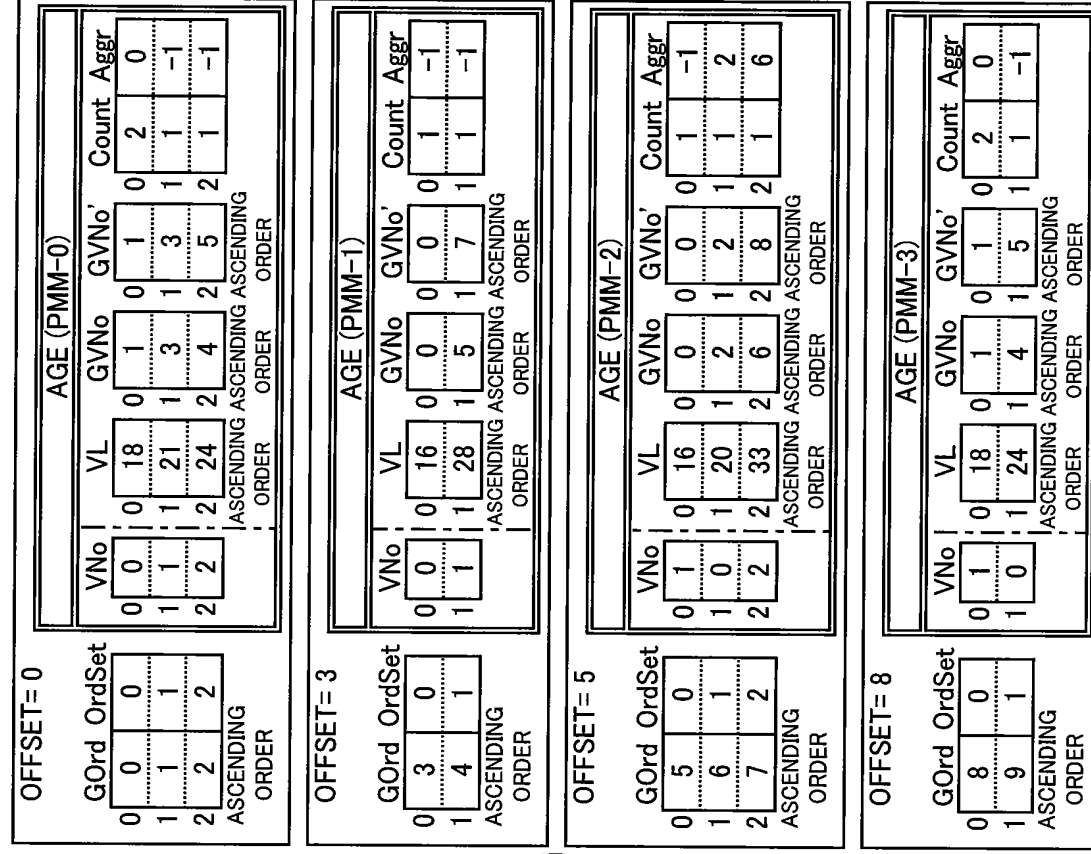
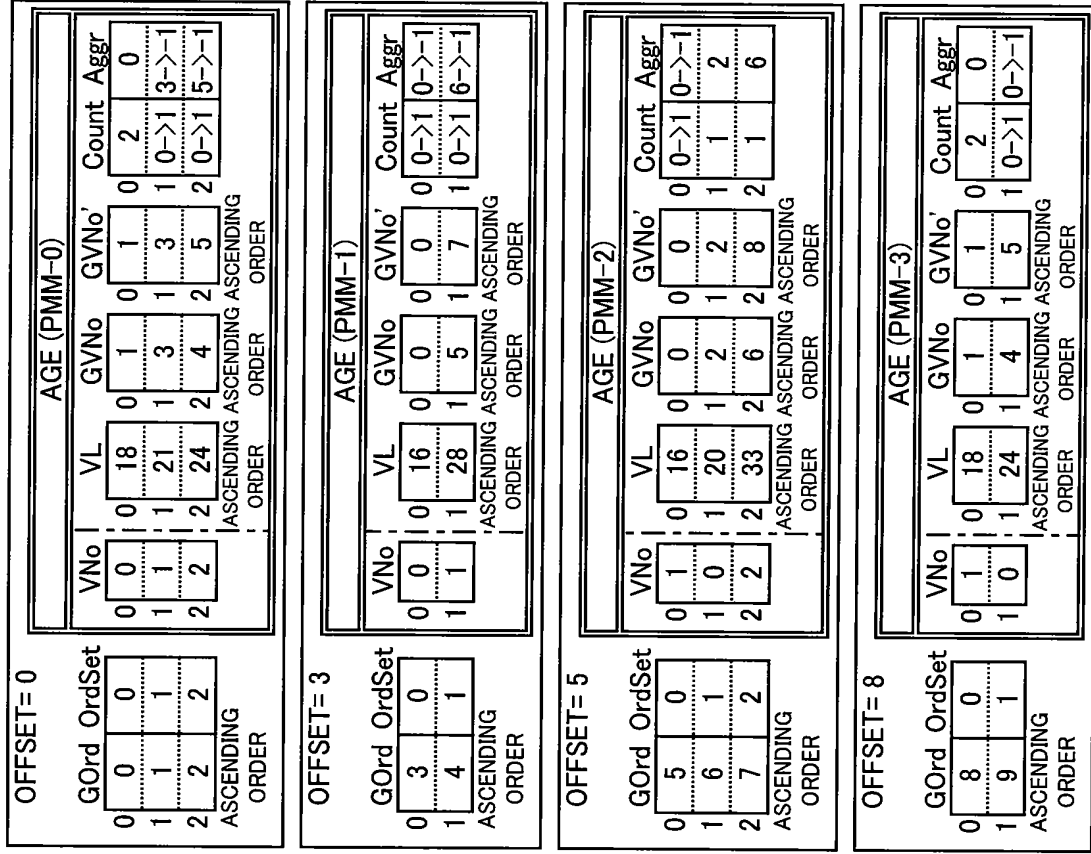


Fig.72

PMM-0				OFFSET=0			
SEX	AGE	HEIGHT	WEIGHT	SetAggr	GOrd	OrdSet	
0 FEMALE	18	168	55	0	0	0	
1 MALE	21	172	64	1	1	1	
2 FEMALE	24	159	48	2	2	2	
				ASCENDING ORDER			
				AGE (PMM-0)			
				VNo	VL	GVNo	Count Aggr
				0	0	1	2 0
				1	1	3	1 -1
				2	2	4	1 -1
				ASCENDING ORDER			
				ASCENDING ORDER			

Fig.73

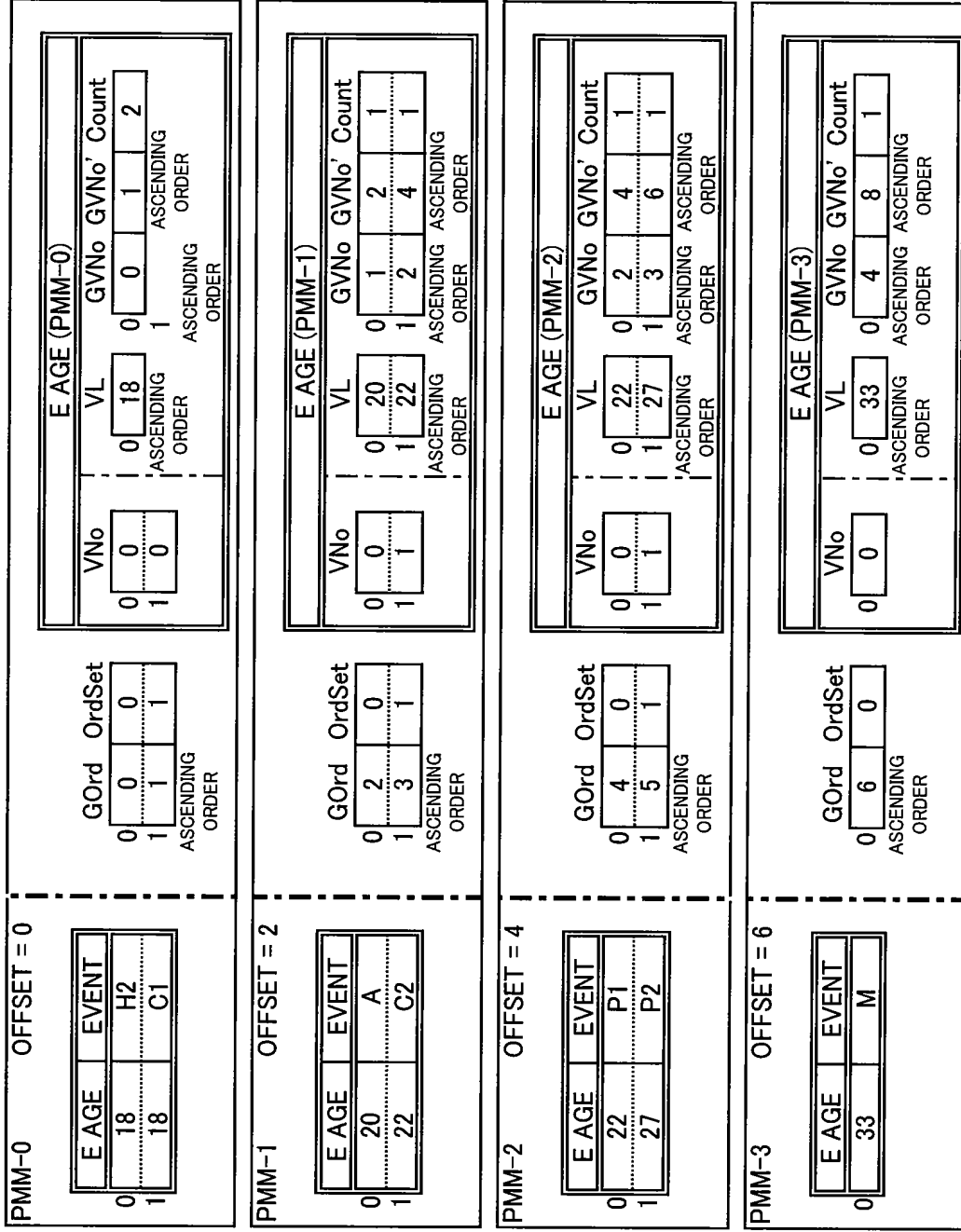


Fig.74

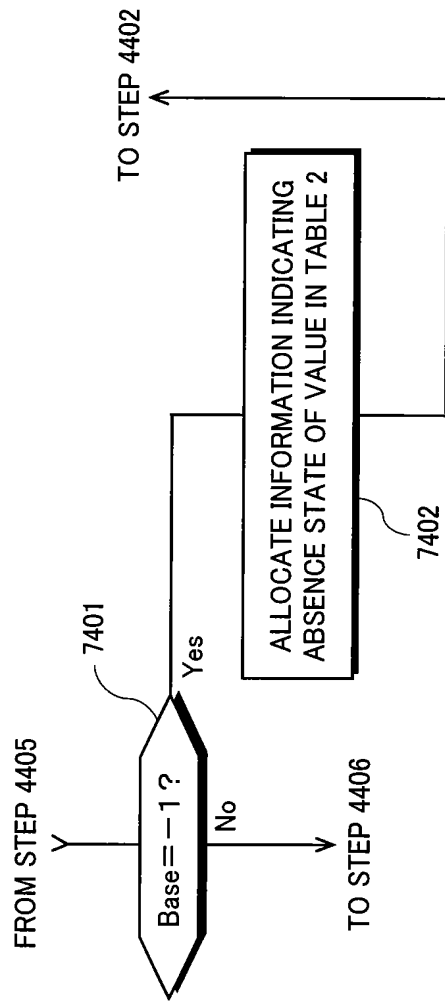


TABLE 2

OFFSET=0

E AGE (PMM=0)					
GOrd	OrdSet	VN0	VL	GVN0	Count
0	0	0	0	0	0
1	0	0	18	0	1
1	1	0	0	1	2

Ascending Order

ORDER

OFFSET=3

E AGE (PMM-1)									
GOrd		OrdSet		VNo	VL	GVNo		GVNo' Count	
0	2	0	0	0	20	0	1	2	1
1	3	1	1	1	22	1	2	4	1
ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

OFFSET=5

E AGE (PMM-2)									
GOrd		OrdSet		VNo	VL	GVNo		GVNo' Count	
0	4	0	0	0	22	0	2	4	1
1	5	1	1	1	27	1	3	6	1
		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

OFFSET=8

E AGE (PMM-3)									
GOrd		OrdSet		VNo	VL	GVNo		GVNo' Count	
0	6	0	0	0	0	33	0	4	8
ASCENDING ORDER				ASCENDING ORDER		ASCENDING ORDER		ASCENDING ORDER	

Fig. 76

4401(Yes)

Fig. 76
4401(Yes)

TABLE 1
OFFSET=0

SetAggr GOrd OrdSet

0	0	0	0
1	2	1	1
2	3	2	2

ASCENDING ORDER

AGE (PMM-0)

VNo	VL	GVNo	GVNo' Count
0	18	0	2
1	21	1	3
2	24	2	4

ASCENDING ORDER

4407

TABLE 2
E AGE (PMM-0)

VNo	VL	GVNo	GVNo' Count
0	0	0	0
1	0	1	1

ASCENDING ORDER

GOrd OrdSet

0	0	0
1	1	1

ASCENDING ORDER

TABLE 3
OFFSET=3

SetAggr GOrd OrdSet

0	4	3	0
1	5	4	1

ASCENDING ORDER

AGE (PMM-1)

VNo	VL	GVNo	GVNo' Count
0	16	0	0
1	28	1	5

ASCENDING ORDER

TABLE 4
OFFSET=5

SetAggr GOrd OrdSet

0	6	5	0
1	7	6	1
2	8	7	2

ASCENDING ORDER

AGE (PMM-2)

VNo	VL	GVNo	GVNo' Count
0	16	0	0
1	20	1	2
2	33	2	6

ASCENDING ORDER

TABLE 5
OFFSET=8

SetAggr GOrd OrdSet

0	9	8	0
1	10	9	1

ASCENDING ORDER

AGE (PMM-3)

VNo	VL	GVNo	GVNo' Count
0	18	0	1
1	24	1	4

ASCENDING ORDER

TABLE 6
E AGE (PMM-1)

VNo	VL	GVNo	GVNo' Count
0	0	0	0
1	22	1	2

ASCENDING ORDER

GOrd OrdSet

0	2	0
1	3	1

ASCENDING ORDER

TABLE 7
E AGE (PMM-2)

VNo	VL	GVNo	GVNo' Count
0	22	0	2
1	27	1	3

ASCENDING ORDER

GOrd OrdSet

0	4	0
1	5	1

ASCENDING ORDER

TABLE 8
E AGE (PMM-3)

VNo	VL	GVNo	GVNo' Count
0	0	0	0
1	33	1	4

ASCENDING ORDER

GOrd OrdSet

0	6	0
1	6	0

ASCENDING ORDER

Fig. 77

4401(Yes)

TABLE 1

OFFSET= 0

AGE (PMM-0)															
SetAggr		GOrd		OrdSet		VNo		VL		GVNo		Count		Aggr	
0	0	0	0	0	0	0	0	0	18	0	1	1	2	0	
1	2	1	1	1	1	1	1	1	21	1	3	3	1	-1	
2	3	2	2	2	2	2	2	2	24	2	4	5	1	-1	
ASCENDING ORDER						ASCENDING ORDER						ASCENDING ORDER			

Fig.78

●RECORD OF JOIN TABLE = 0	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>0 FEMALE</td><td>18</td><td>168</td><td>55</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	0 FEMALE	18	168	55	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>0 18</td><td>H2</td></tr></table>	TABLE 2		E AGE	EVENT	0 18	H2
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
0 FEMALE	18	168	55																	
TABLE 2																				
E AGE	EVENT																			
0 18	H2																			
●RECORD OF JOIN TABLE = 1	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>0 FEMALE</td><td>18</td><td>168</td><td>55</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	0 FEMALE	18	168	55	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>1 18</td><td>C1</td></tr></table>	TABLE 2		E AGE	EVENT	1 18	C1
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
0 FEMALE	18	168	55																	
TABLE 2																				
E AGE	EVENT																			
1 18	C1																			
●RECORD OF JOIN TABLE = 2	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>1 MALE</td><td>21</td><td>172</td><td>64</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	1 MALE	21	172	64	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>-1 -</td><td>-</td></tr></table>	TABLE 2		E AGE	EVENT	-1 -	-
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
1 MALE	21	172	64																	
TABLE 2																				
E AGE	EVENT																			
-1 -	-																			
●RECORD OF JOIN TABLE = 3	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>2 FEMALE</td><td>24</td><td>159</td><td>48</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	2 FEMALE	24	159	48	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>-1 -</td><td>-</td></tr></table>	TABLE 2		E AGE	EVENT	-1 -	-
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
2 FEMALE	24	159	48																	
TABLE 2																				
E AGE	EVENT																			
-1 -	-																			
●RECORD OF JOIN TABLE = 4	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>3 FEMALE</td><td>16</td><td>172</td><td>48</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	3 FEMALE	16	172	48	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>-1 -</td><td>-</td></tr></table>	TABLE 2		E AGE	EVENT	-1 -	-
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
3 FEMALE	16	172	48																	
TABLE 2																				
E AGE	EVENT																			
-1 -	-																			
●RECORD OF JOIN TABLE = 5	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>4 MALE</td><td>28</td><td>181</td><td>78</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	4 MALE	28	181	78	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>-1 -</td><td>-</td></tr></table>	TABLE 2		E AGE	EVENT	-1 -	-
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
4 MALE	28	181	78																	
TABLE 2																				
E AGE	EVENT																			
-1 -	-																			
●RECORD OF JOIN TABLE = 6	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>5 FEMALE</td><td>20</td><td>166</td><td>55</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	5 FEMALE	20	166	55	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>2 20</td><td>A</td></tr></table>	TABLE 2		E AGE	EVENT	2 20	A
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
5 FEMALE	20	166	55																	
TABLE 2																				
E AGE	EVENT																			
2 20	A																			
●RECORD OF JOIN TABLE = 7	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>6 FEMALE</td><td>16</td><td>168</td><td>52</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	6 FEMALE	16	168	52	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>-1 -</td><td>-</td></tr></table>	TABLE 2		E AGE	EVENT	-1 -	-
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
6 FEMALE	16	168	52																	
TABLE 2																				
E AGE	EVENT																			
-1 -	-																			
●RECORD OF JOIN TABLE = 8	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>7 MALE</td><td>33</td><td>174</td><td>65</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	7 MALE	33	174	65	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>6 33</td><td>M</td></tr></table>	TABLE 2		E AGE	EVENT	6 33	M
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
7 MALE	33	174	65																	
TABLE 2																				
E AGE	EVENT																			
6 33	M																			
●RECORD OF JOIN TABLE = 9	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>8 MALE</td><td>24</td><td>177</td><td>64</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	8 MALE	24	177	64	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>-1 -</td><td>-</td></tr></table>	TABLE 2		E AGE	EVENT	-1 -	-
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
8 MALE	24	177	64																	
TABLE 2																				
E AGE	EVENT																			
-1 -	-																			
●RECORD OF JOIN TABLE = 10	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>9 FEMALE</td><td>18</td><td>170</td><td>55</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	9 FEMALE	18	170	55	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>0 18</td><td>H2</td></tr></table>	TABLE 2		E AGE	EVENT	0 18	H2
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
9 FEMALE	18	170	55																	
TABLE 2																				
E AGE	EVENT																			
0 18	H2																			
●RECORD OF JOIN TABLE = 11	<table><tr><th colspan="4">TABLE 1</th></tr><tr><th>SEX</th><th>AGE</th><th>HEIGHT</th><th>WEIGHT</th></tr><tr><td>9 FEMALE</td><td>18</td><td>170</td><td>55</td></tr></table>	TABLE 1				SEX	AGE	HEIGHT	WEIGHT	9 FEMALE	18	170	55	<table><tr><th colspan="2">TABLE 2</th></tr><tr><th>E AGE</th><th>EVENT</th></tr><tr><td>1 18</td><td>C1</td></tr></table>	TABLE 2		E AGE	EVENT	1 18	C1
TABLE 1																				
SEX	AGE	HEIGHT	WEIGHT																	
9 FEMALE	18	170	55																	
TABLE 2																				
E AGE	EVENT																			
1 18	C1																			

Fig.79

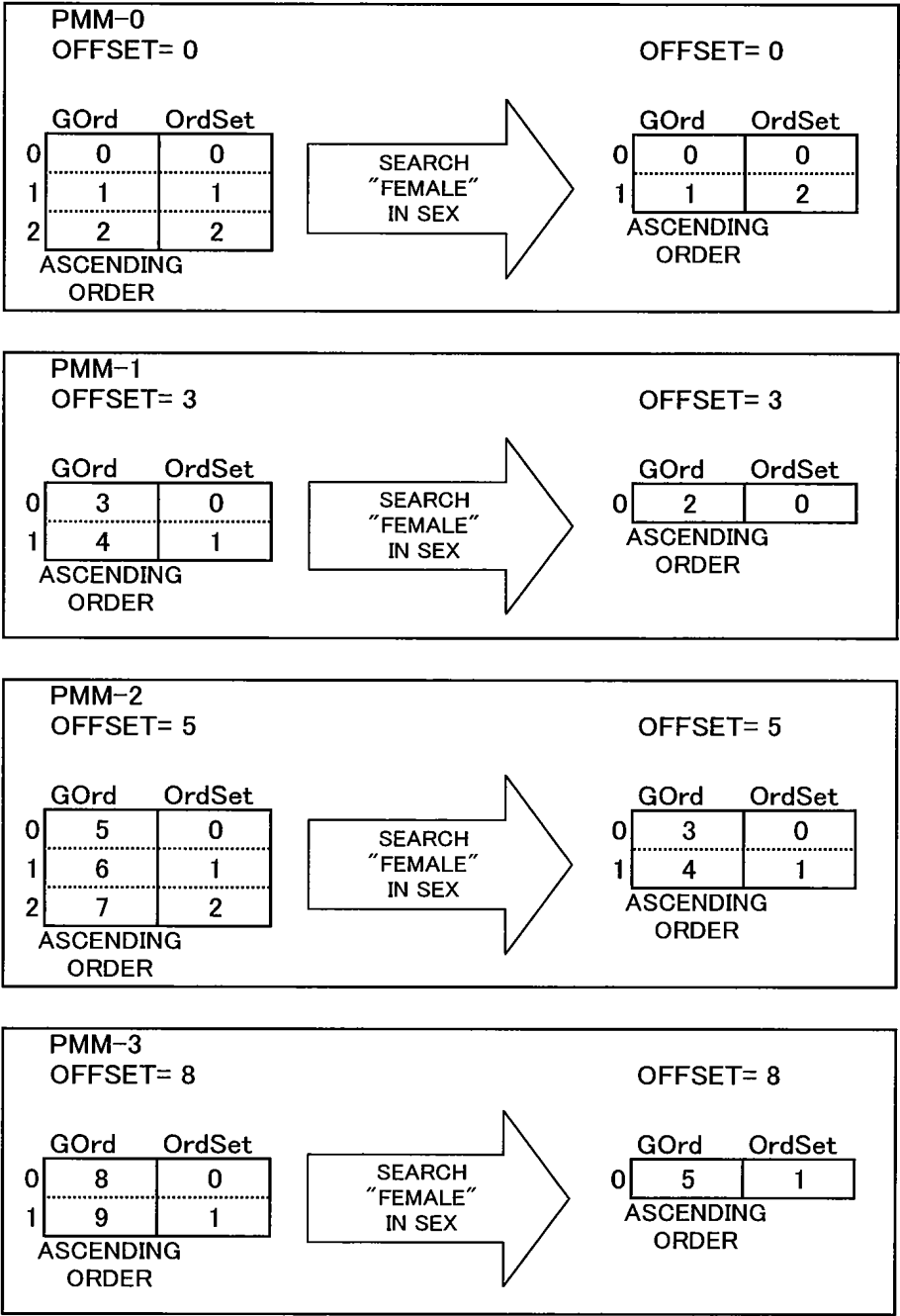


Fig.80

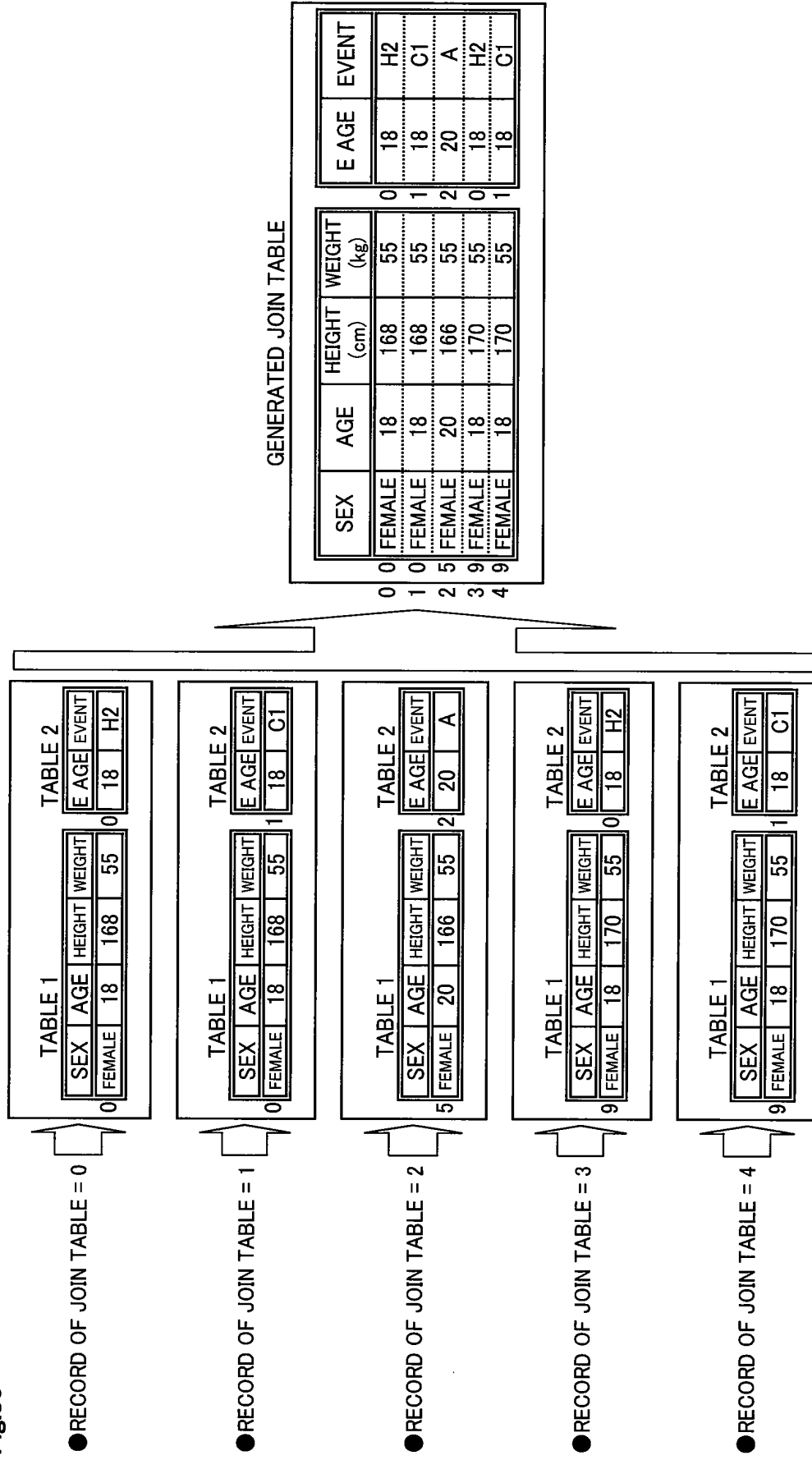


Fig.81

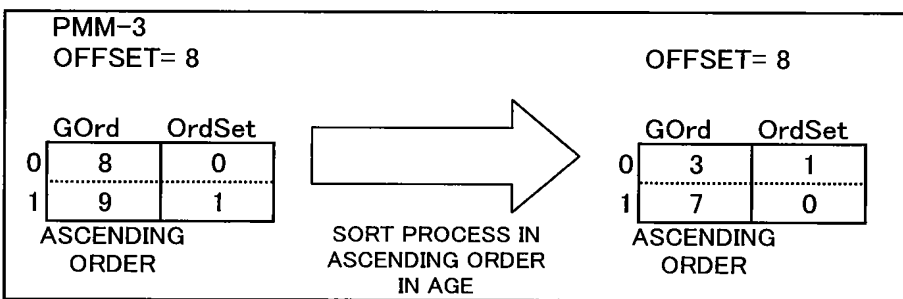
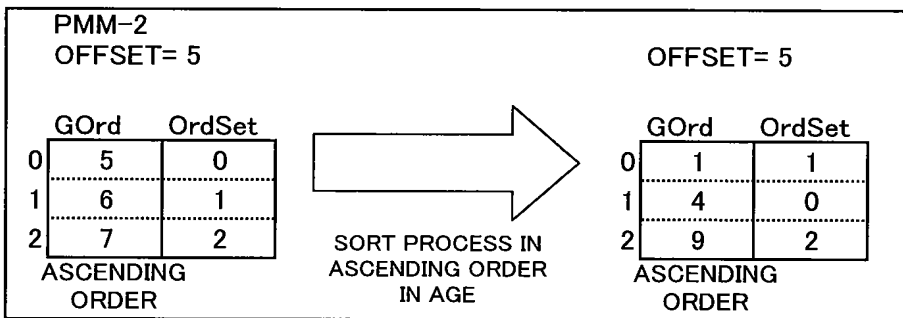
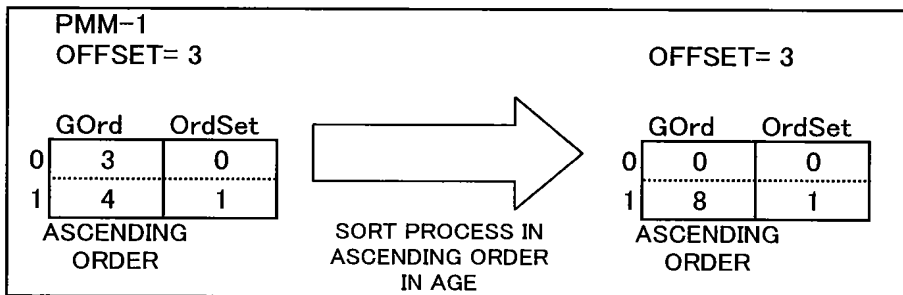
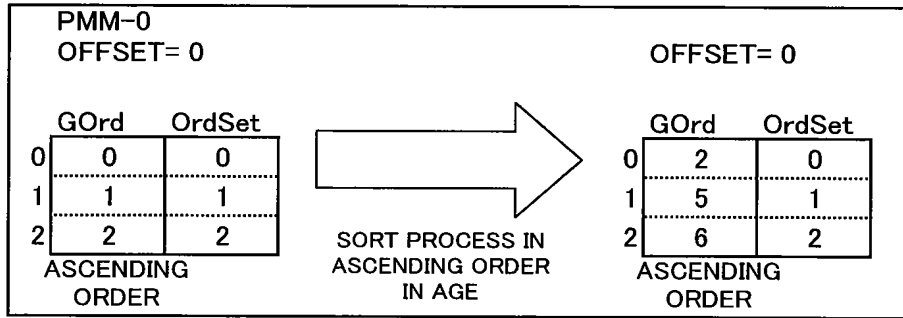


Fig.82

PMM-0		AGE (PMM-0)	
SEX	AGE	HEIGHT	WEIGHT
0 FEMALE	18	168	55
1 MALE	21	172	64
2 FEMALE	24	159	48

SetAggr		GOrd	OrdSet
0	0	2	0
1	5	5	1
2	5	6	2

VN0		VL	GVN0	Count	Aggr
0	0	0	1	1	2
1	1	1	3	3	0
2	2	2	4	5	0

ASCENDING ORDER		ASCENDING ORDER	
ORDER		ORDER	

AGE (PMM-0)	
0	18
1	21
2	24

ASCENDING ORDER	
ORDER	

 OFFSET= 0 | || PMM-1 | | AGE (PMM-1) | |
SEX	AGE	HEIGHT	WEIGHT
0 FEMALE	16	172	48
1 MALE	28	181	78

SetAggr		GOrd	OrdSet
0	0	0	0
1	5	8	1

VN0		VL	GVN0	Count	Aggr
0	0	0	0	0	0
1	1	1	5	7	0

ASCENDING ORDER		ASCENDING ORDER	
ORDER		ORDER	

AGE (PMM-1)	
0	16
1	28

ASCENDING ORDER	
ORDER	

 OFFSET= 3 | || PMM-2 | | AGE (PMM-2) | |
SEX	AGE	HEIGHT	WEIGHT
0 FEMALE	20	166	55
1 FEMALE	16	168	52
2 MALE	33	174	65

SetAggr		GOrd	OrdSet
0	0	1	1
1	4	4	0
2	5	9	2

VN0		VL	GVN0	Count	Aggr
0	1	0	0	0	0
1	0	1	2	2	1
2	2	2	6	8	1

ASCENDING ORDER		ASCENDING ORDER	
ORDER		ORDER	

AGE (PMM-2)	
0	16
1	20
2	33

ASCENDING ORDER	
ORDER	

 OFFSET= 5 | || PMM-3 | | AGE (PMM-3) | |
SEX	AGE	HEIGHT	WEIGHT
0 MALE	24	177	64
1 FEMALE	18	170	55

SetAggr		GOrd	OrdSet
0	2	3	1
1	5	7	0

VN0		VL	GVN0	Count	Aggr
0	1	0	1	1	2
1	0	1	4	5	0

ASCENDING ORDER		ASCENDING ORDER	
ORDER		ORDER	

AGE (PMM-3)	
0	18
1	24

ASCENDING ORDER	
ORDER	

 OFFSET= 8 | |

Fig.83

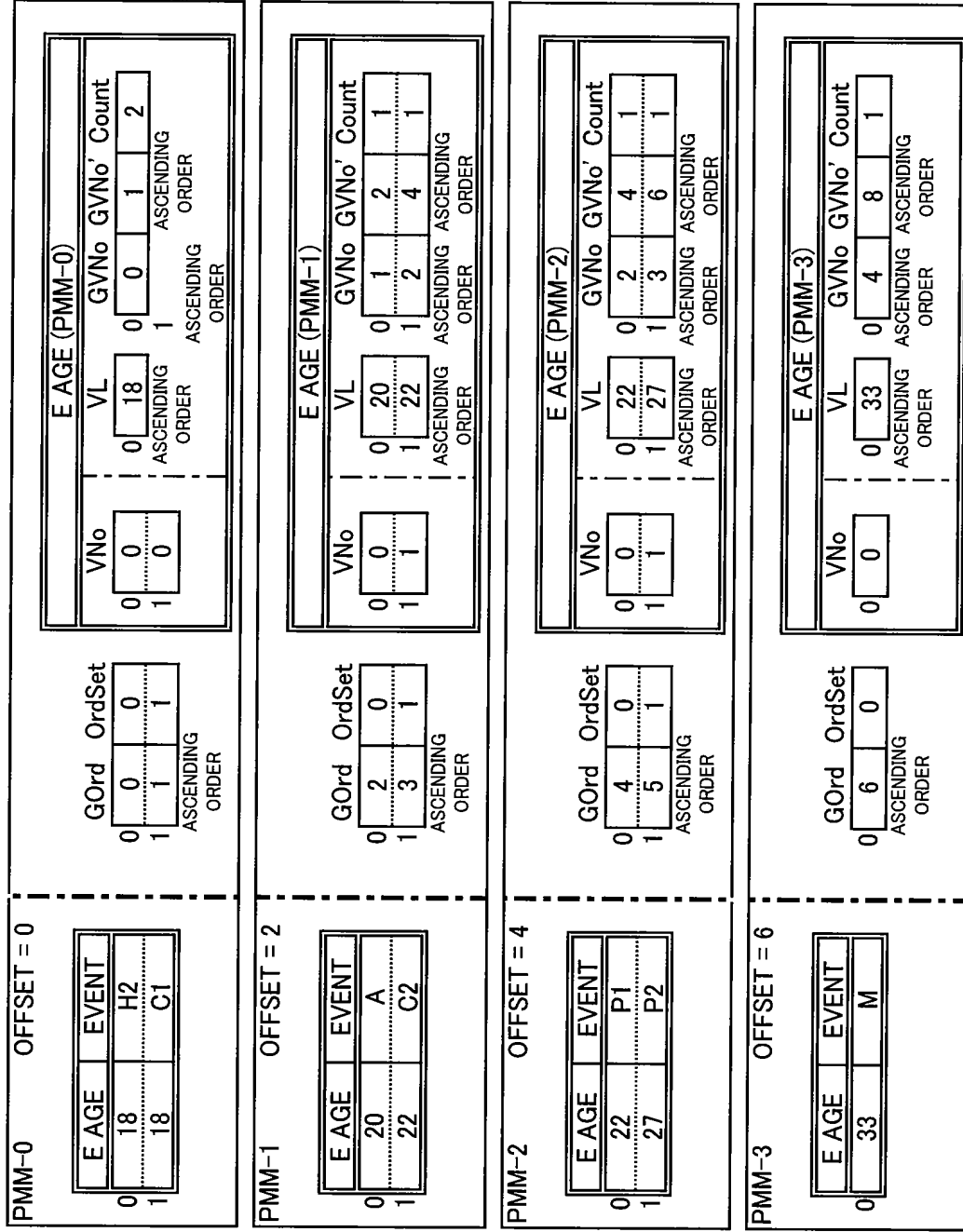


Fig 84

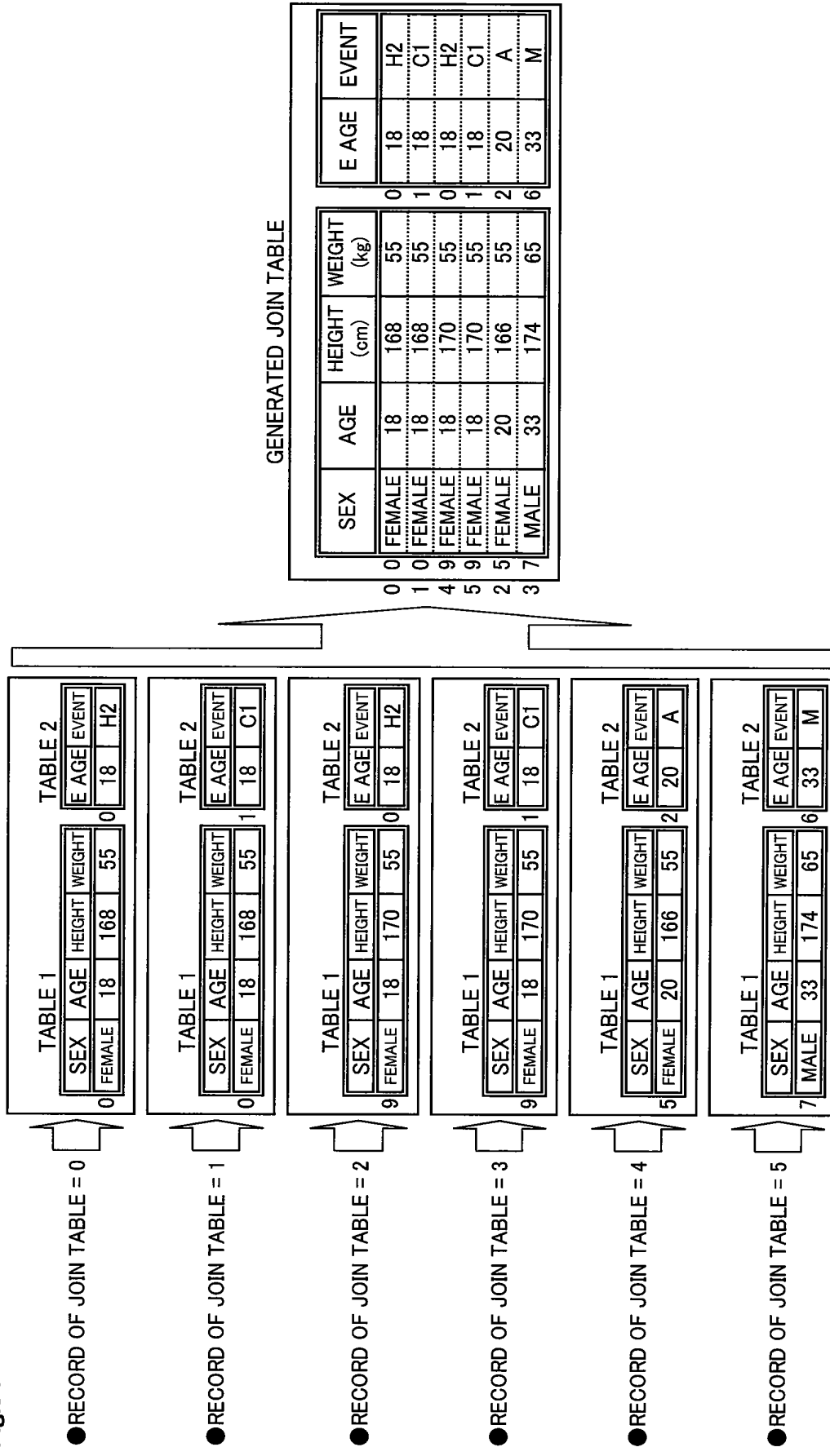


Fig.86

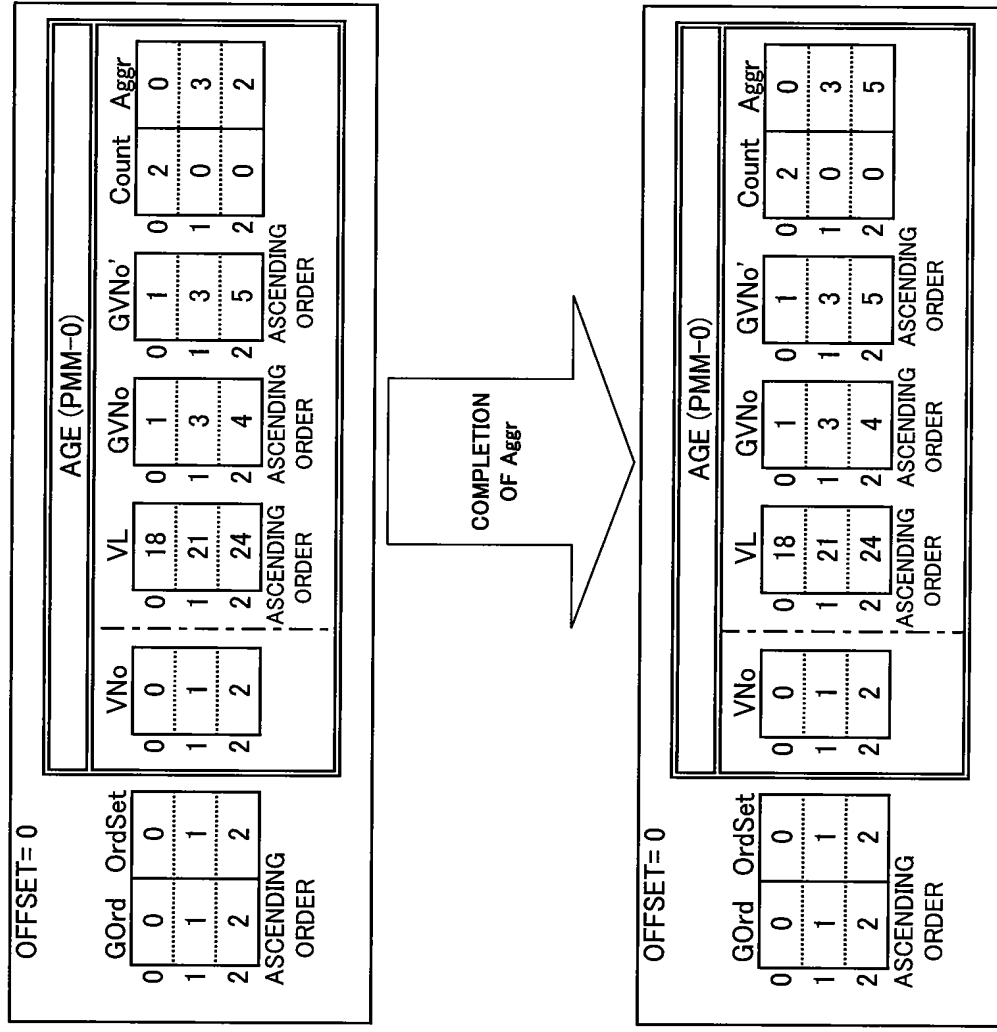


Fig.87

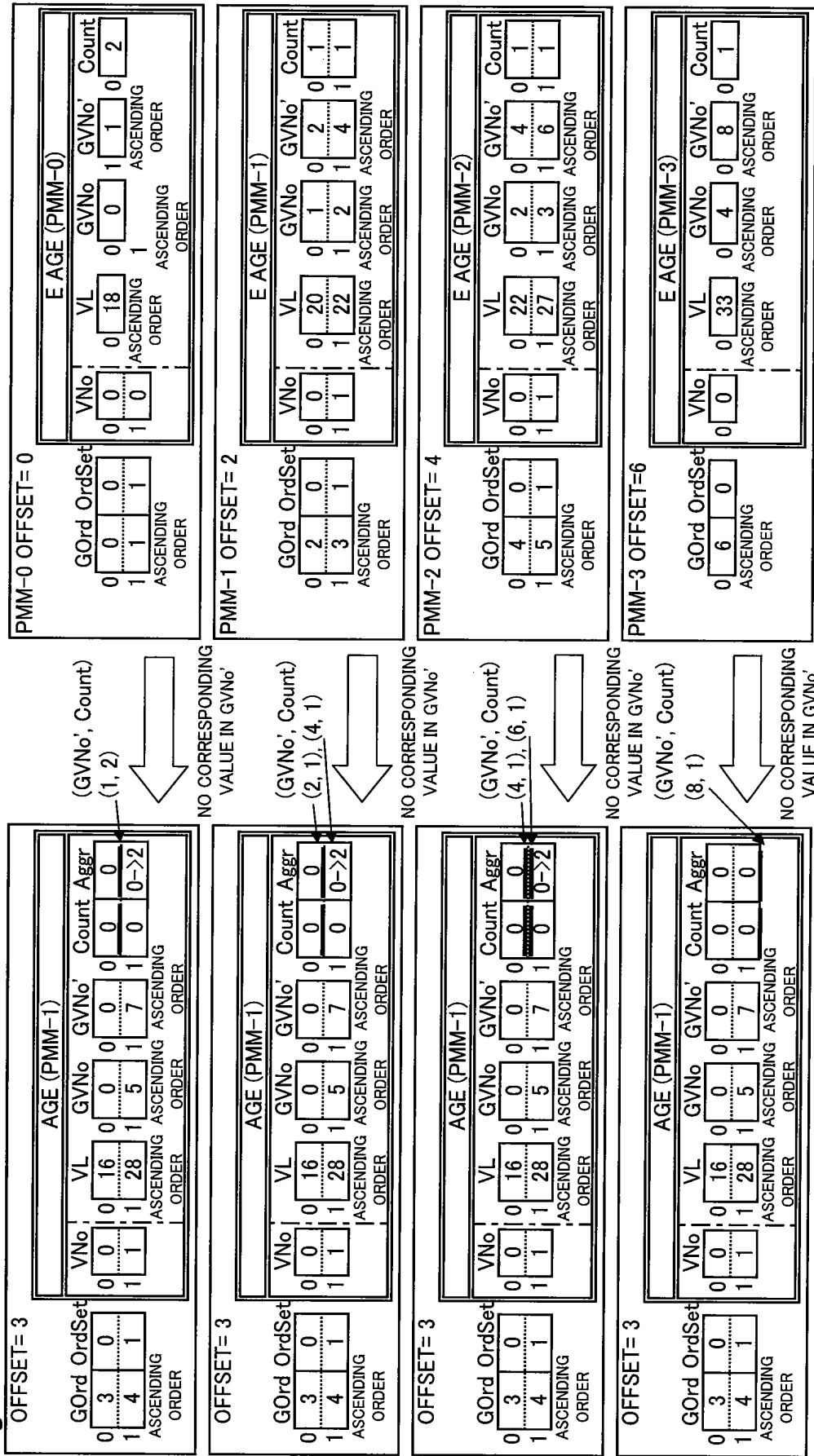


Fig.88

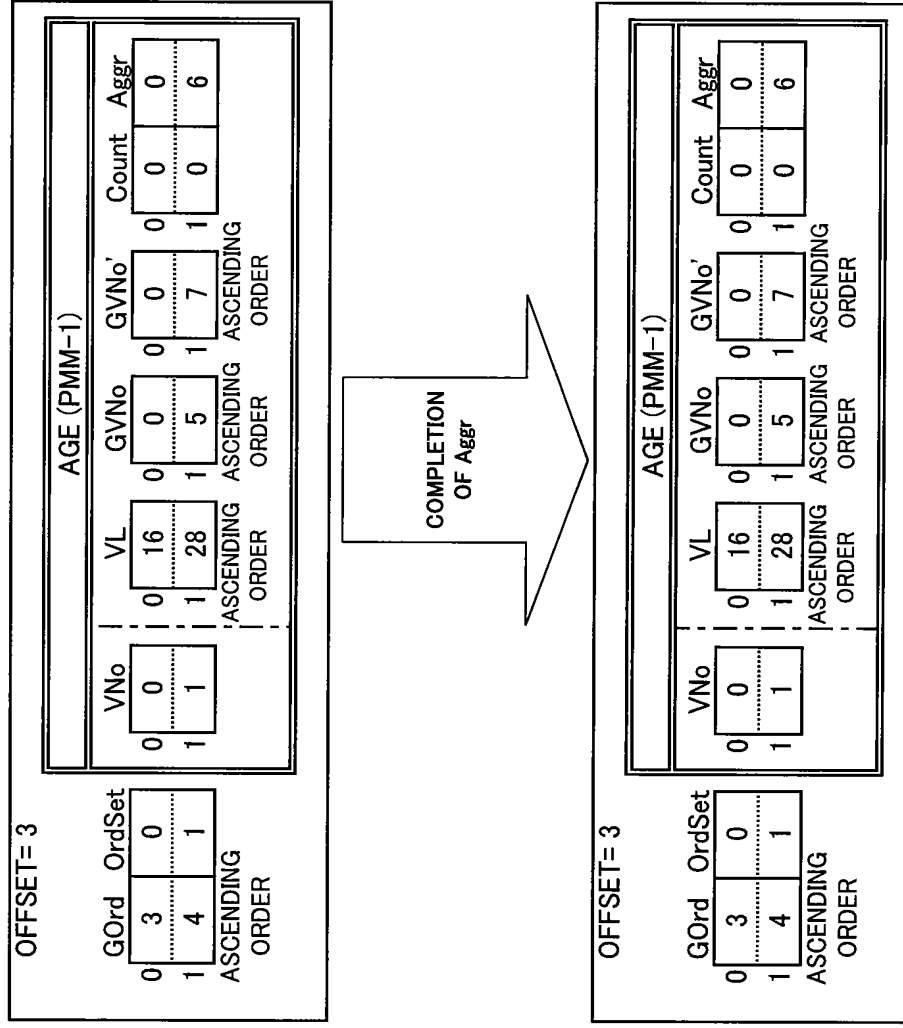


Fig.90

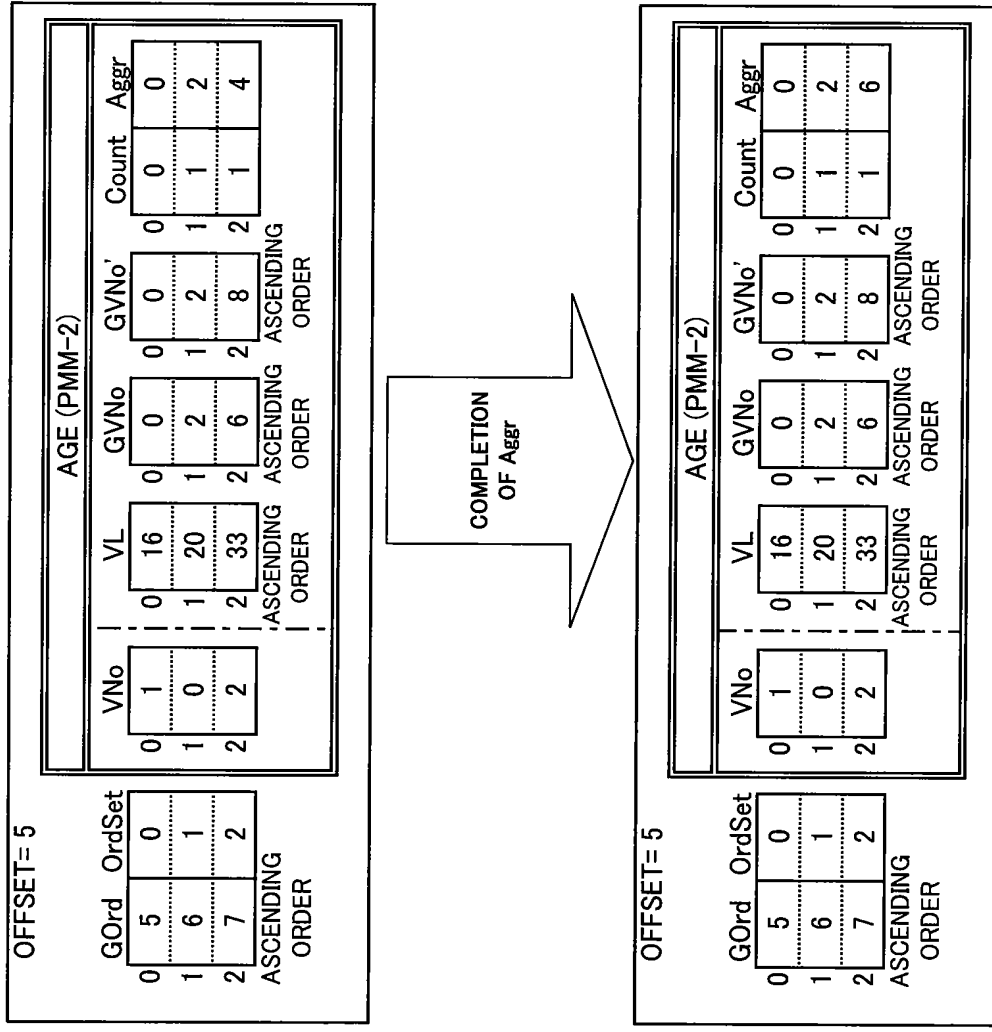


Fig.91

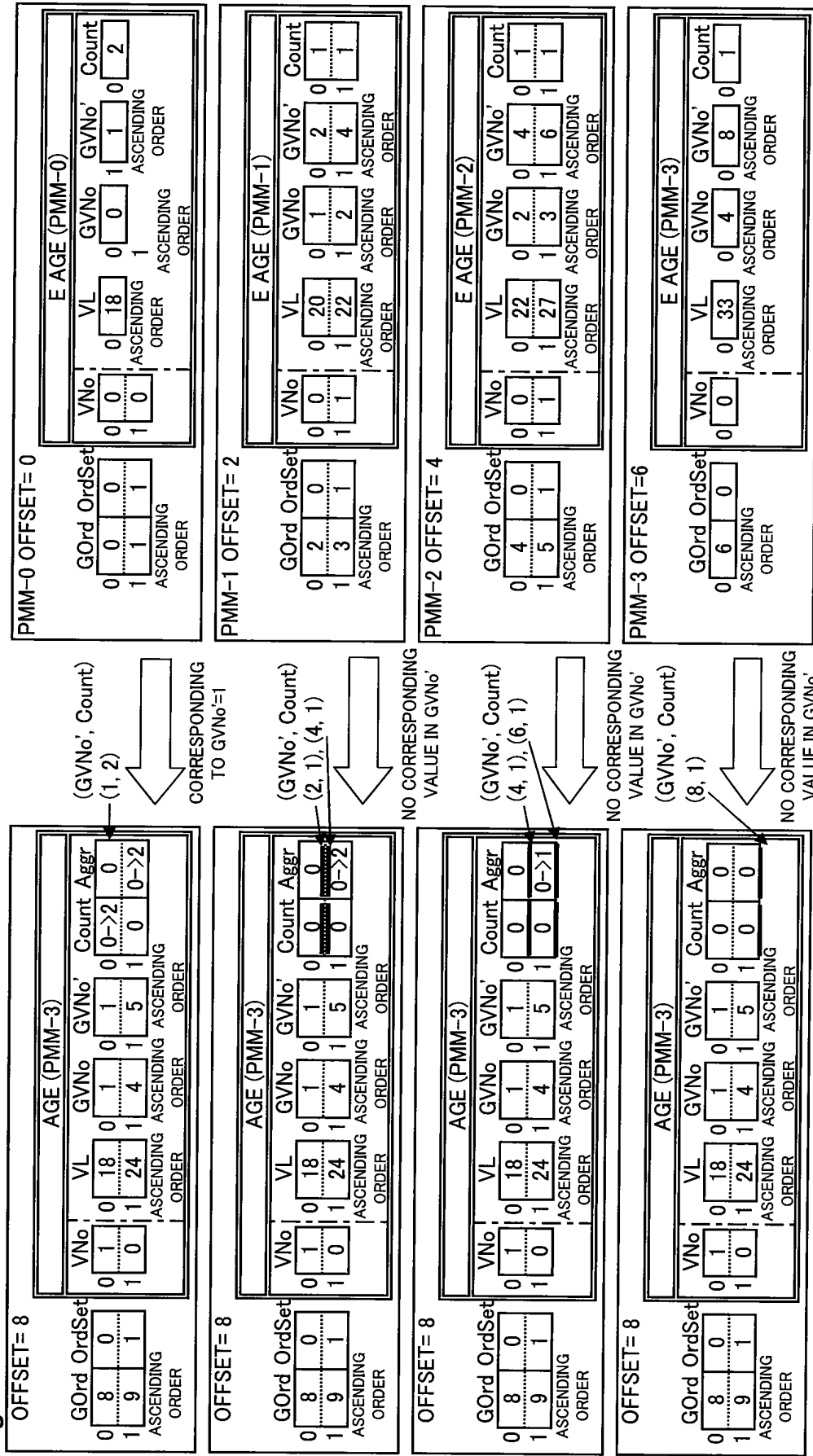


Fig.92

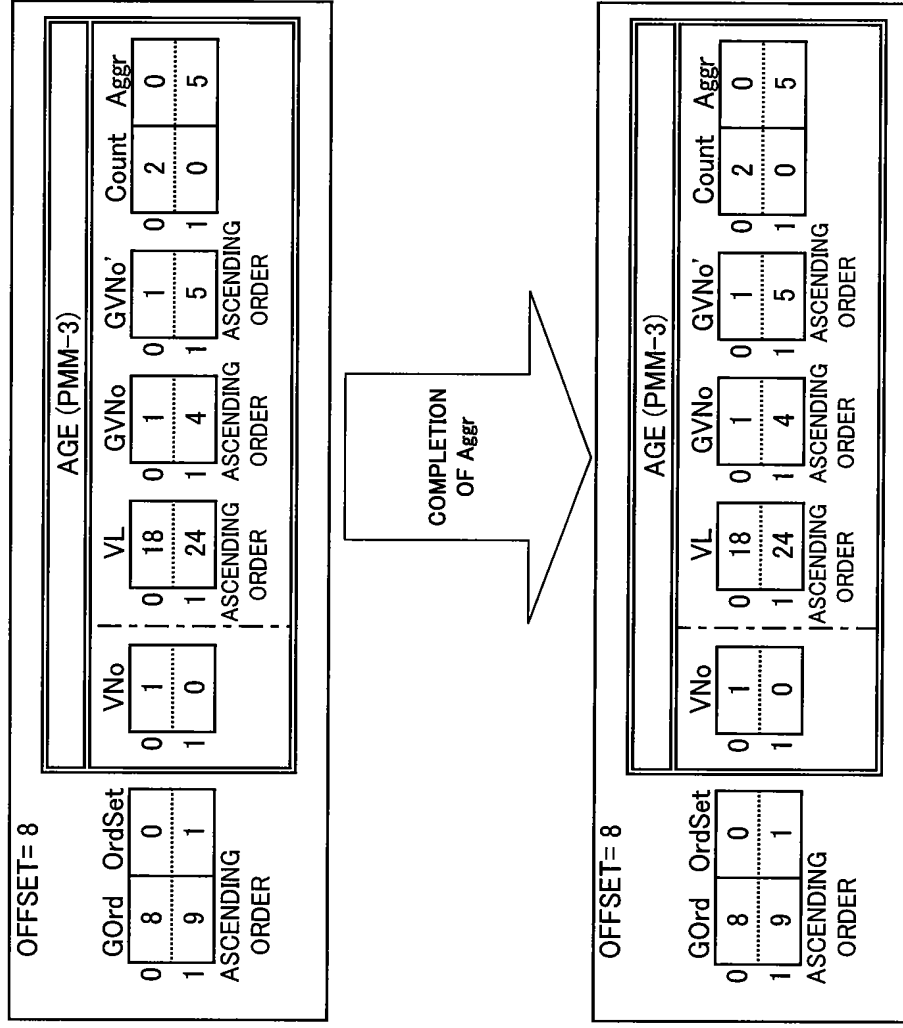


Fig.93

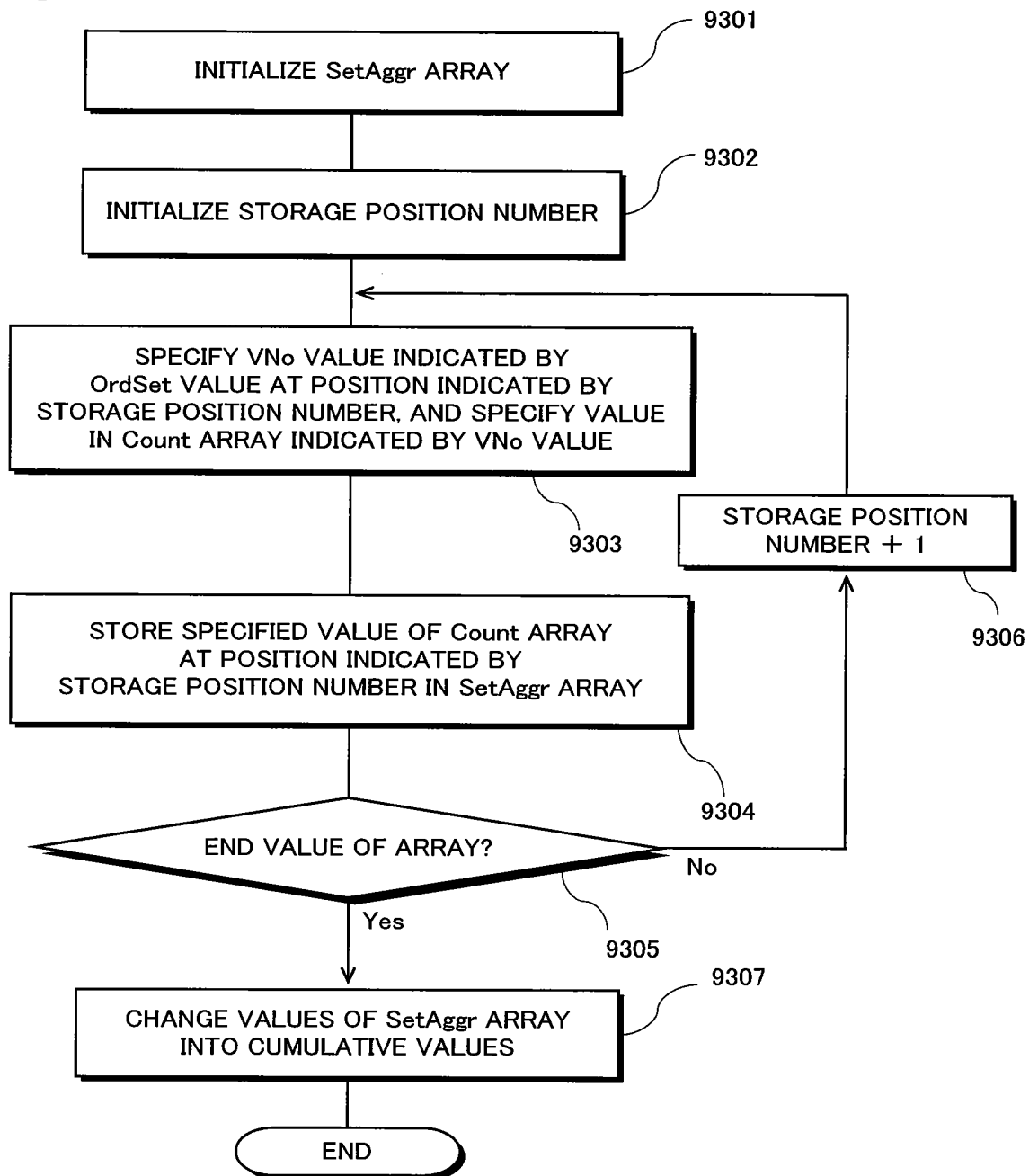


Fig.94

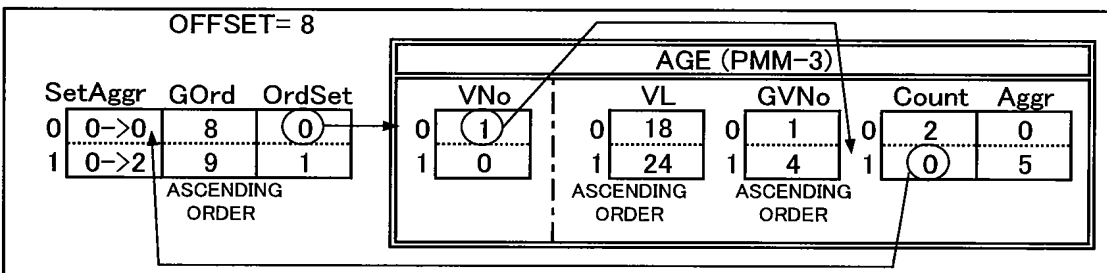
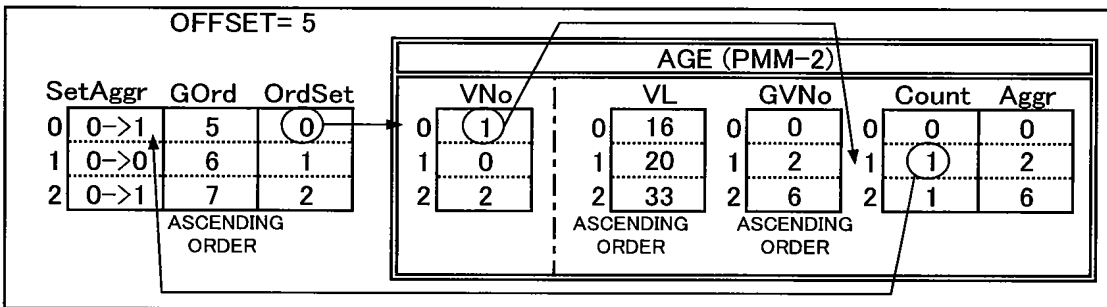
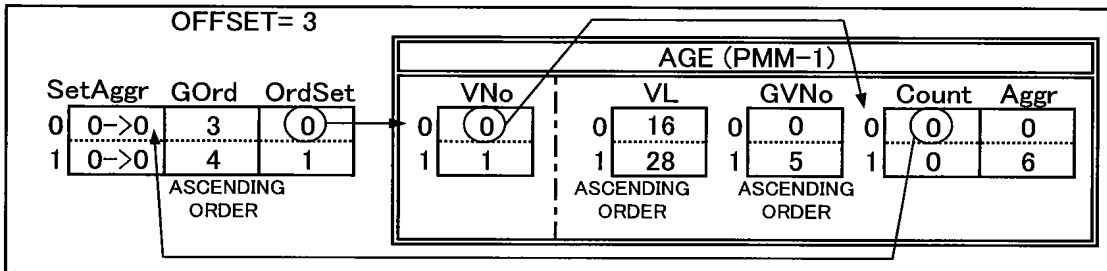
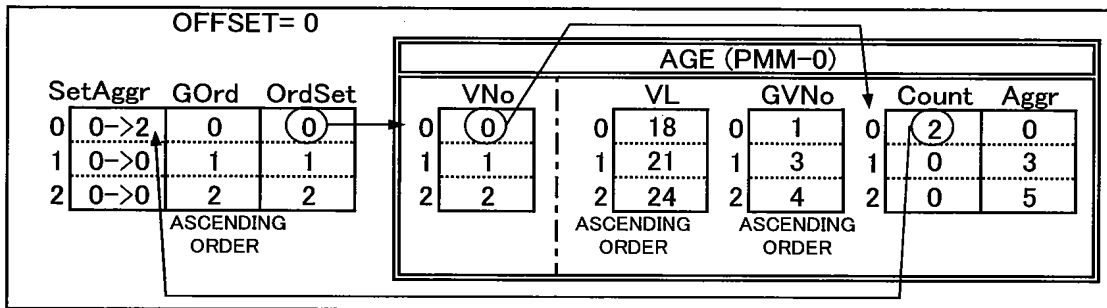
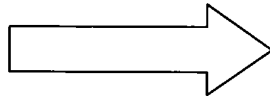


Fig.95A

PMM-0

SetAggr	
0	2
1	0
2	0



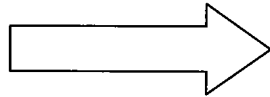
CHANGE INTO
CUMULATIVE VALUES

SetAggr	
0	0
1	2
2	2

ASCENDING
ORDER

PMM-1

SetAggr	
0	0
1	0



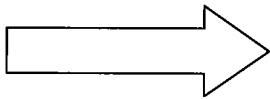
CHANGE INTO
CUMULATIVE VALUES

SetAggr	
0	0
1	0

ASCENDING
ORDER

PMM-2

SetAggr	
0	1
1	0
2	1



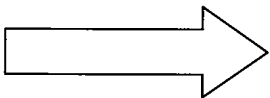
CHANGE INTO
CUMULATIVE VALUES

SetAggr	
0	0
1	1
2	1

ASCENDING
ORDER

PMM-3

SetAggr	
0	0
1	2



CHANGE INTO
CUMULATIVE VALUES

SetAggr	
0	0
1	0

ASCENDING
ORDER

Fig.95B

Fig.96

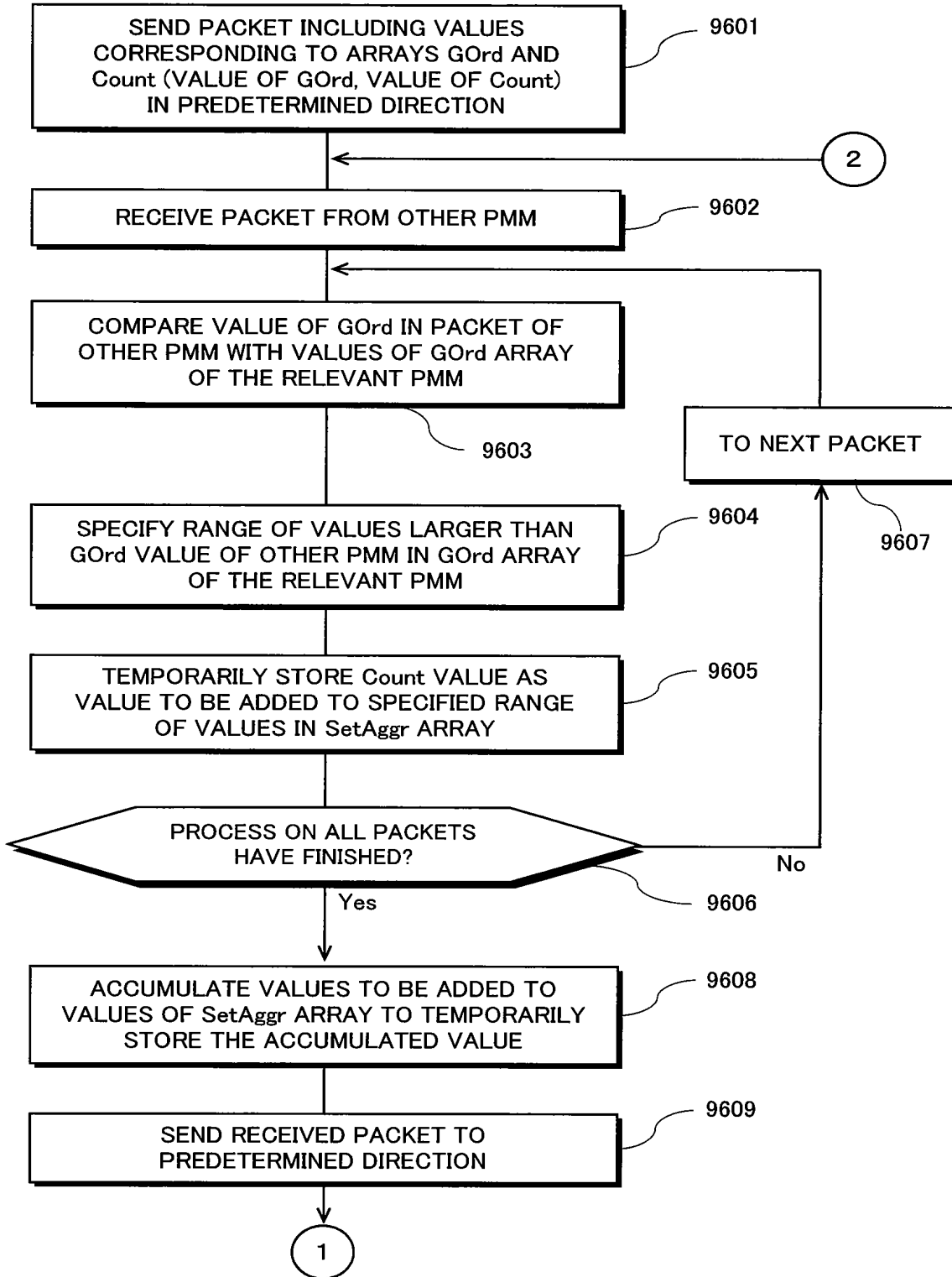


Fig.97

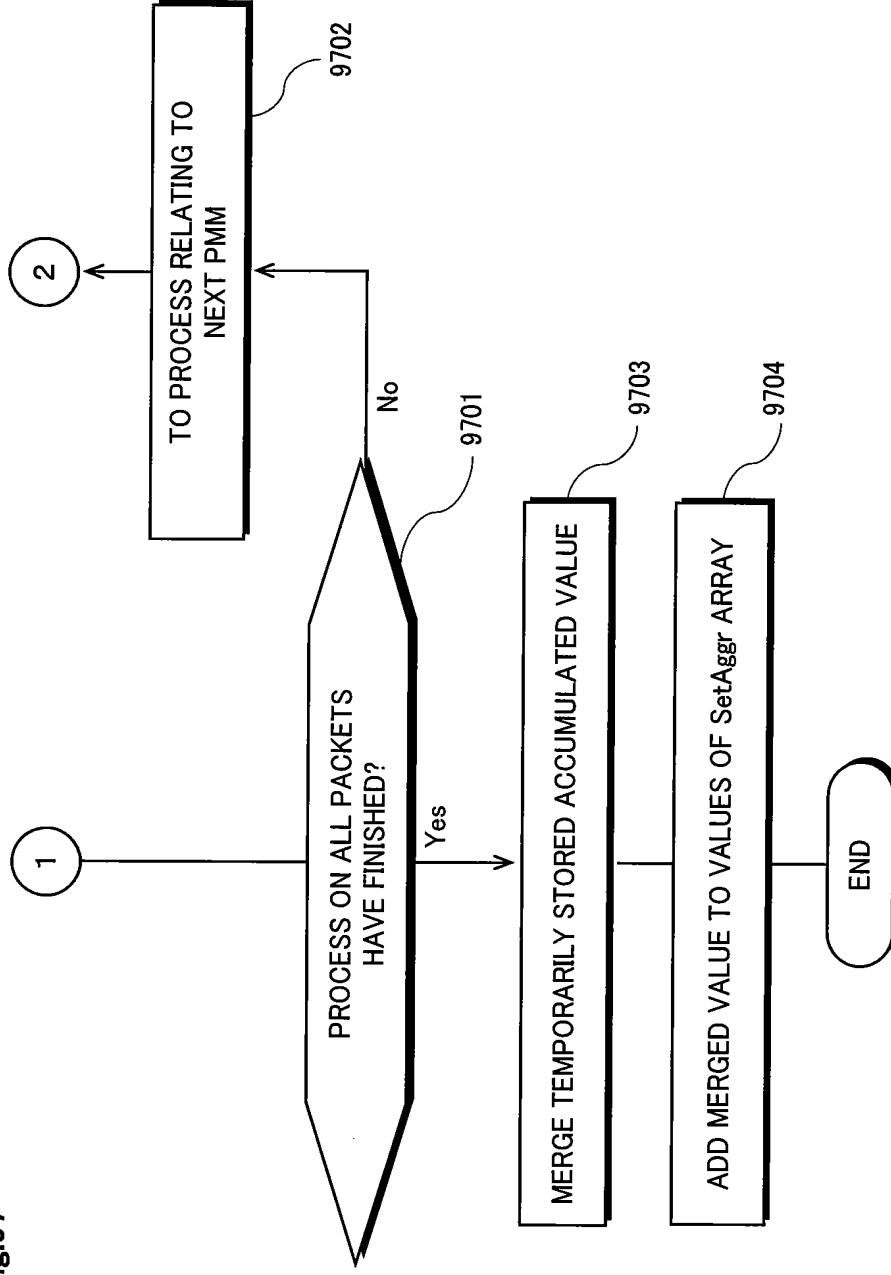


Fig.98

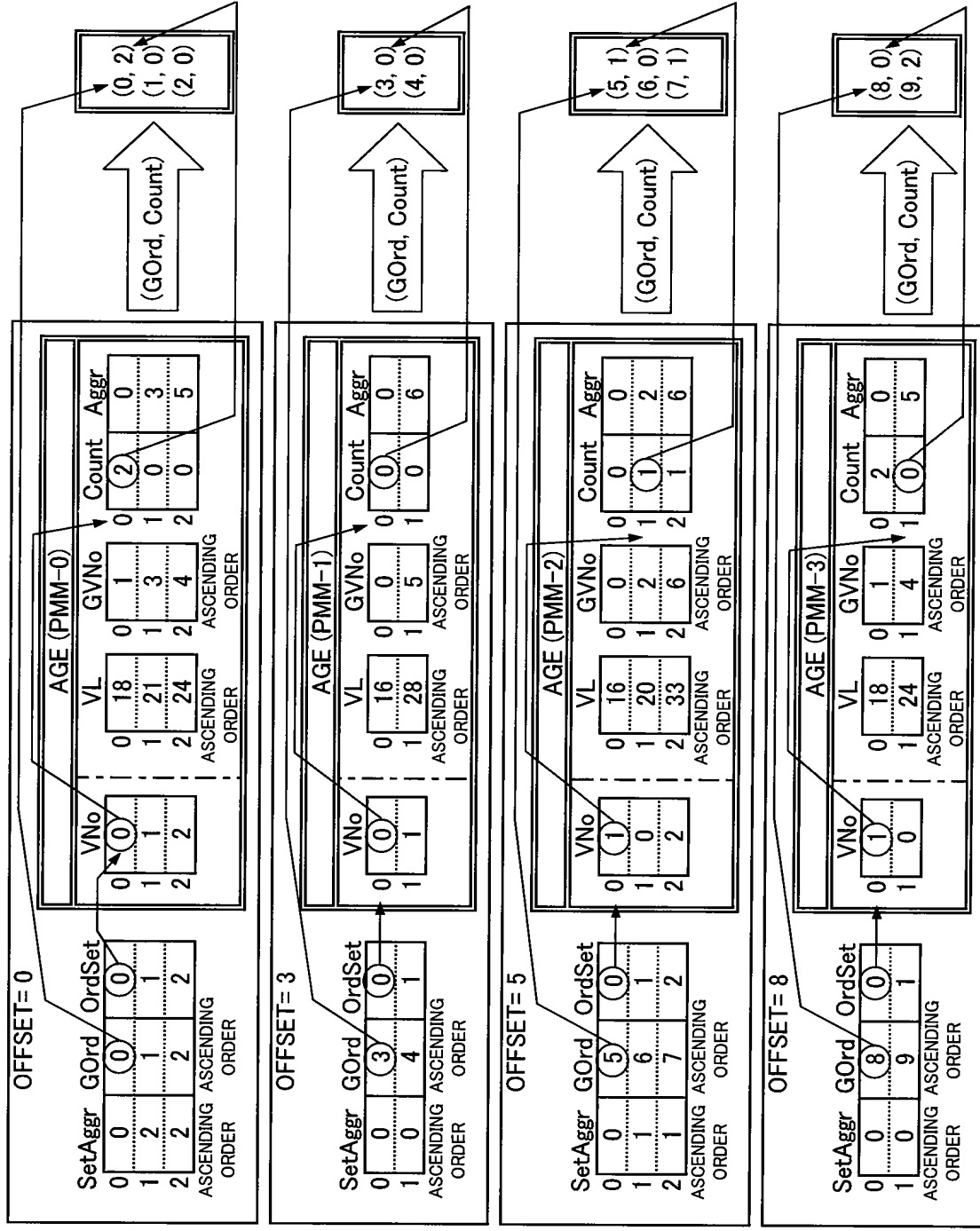


Fig.99

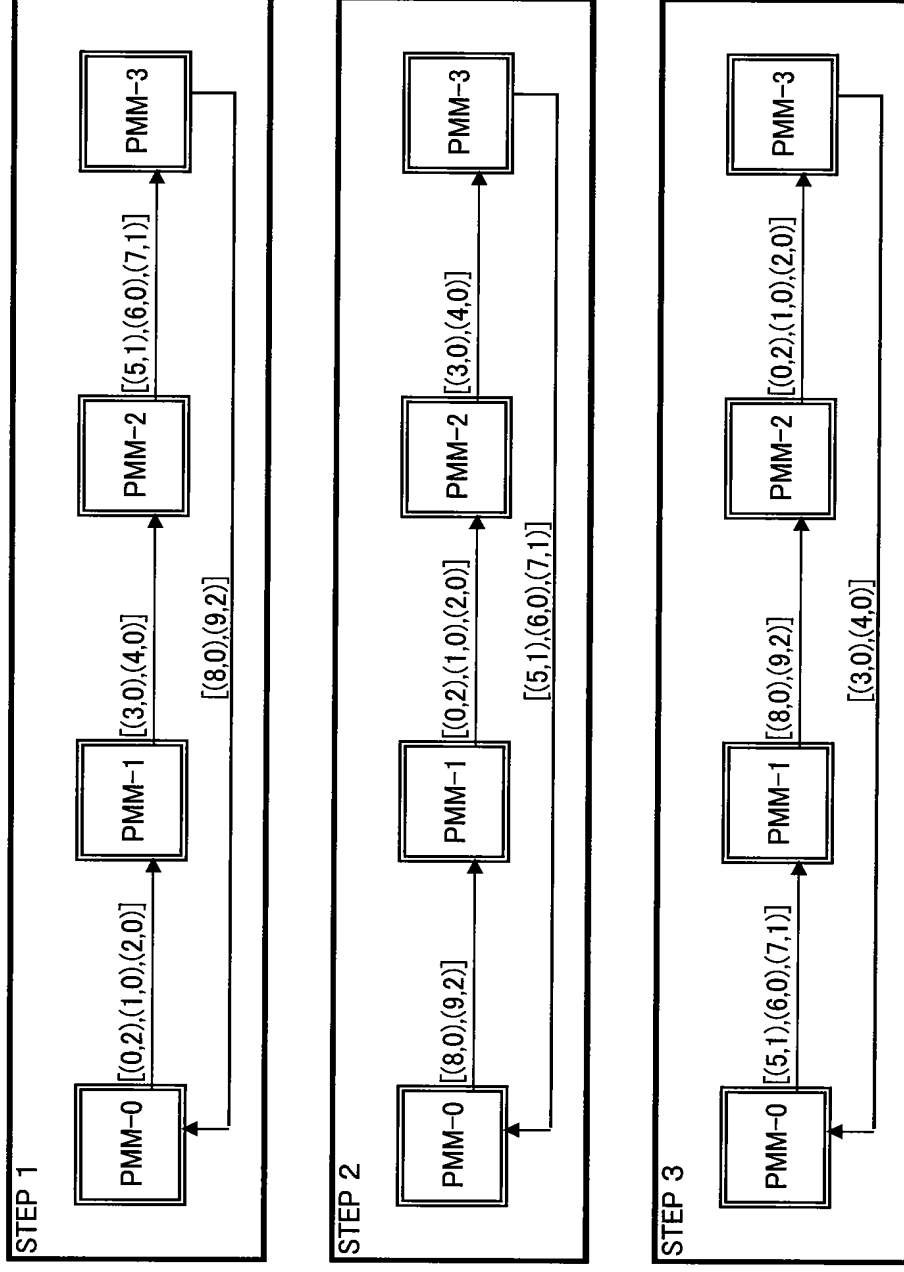


Fig.100

STEP 1

RECEIVED LIST			
PMM-0	PMM-1	PMM-2	PMM-3
[(8,0),(9,2)]	[(0,2),(1,0),(2,0)]	[(3,0),(4,0)]	[(5,1),(6,0),(7,1)]

STEP 2

RECEIVED LIST			
PMM-0	PMM-1	PMM-2	PMM-3
[(8,0),(9,2)] [(5,1),(6,0),(7,1)]	[(0,2),(1,0),(2,0)] [(8,0),(9,2)]	[(3,0),(4,0)] [(0,2),(1,0),(2,0)]	[(5,1),(6,0),(7,1)] [(3,0),(4,0)]

STEP 3

RECEIVED LIST			
PMM-0	PMM-1	PMM-2	PMM-3
[(8,0),(9,2)] [(5,1),(6,0),(7,1)] [(3,0),(4,0)]	[(0,2),(1,0),(2,0)] [(8,0),(9,2)] [(5,1),(6,0),(7,1)]	[(3,0),(4,0)] [(0,2),(1,0),(2,0)] [(8,0),(9,2)]	[(5,1),(6,0),(7,1)] [(3,0),(4,0)] [(0,2),(1,0),(2,0)]

Diagram illustrating the parallel execution of the above process for three different PMM levels (PMM-3, PMM-2, PMM-1) using a 3x3 grid of data blocks.

OFFSET = 0

PMM-3

SetAggr

0	0
1	2
2	2

ASCENDING ORDER

GOrd OrdSet

0	0	0
1	1	1
2	2	2

ASCENDING ORDER

AGE (PMM-0)

VNo	VL	GVNo	Count	Aggr
0	0	0	2	0
1	1	1	0	3
2	2	2	0	5

ASCENDING ORDER

[[8,0),(9,2]]

PMM-2

SetAggr

0	0
1	2
2	2

ASCENDING ORDER

GOrd OrdSet

0	0	0
1	1	1
2	2	2

ASCENDING ORDER

AGE (PMM-0)

VNo	VL	GVNo	Count	Aggr
0	0	0	2	0
1	1	1	0	3
2	2	2	0	5

ASCENDING ORDER

[[5,1),(6,0),(7,1]]

PMM-1

SetAggr

0	0
1	2
2	2

ASCENDING ORDER

GOrd OrdSet

0	0	0
1	1	1
2	2	2

ASCENDING ORDER

AGE (PMM-0)

VNo	VL	GVNo	Count	Aggr
0	0	0	2	0
1	1	1	0	3
2	2	2	0	5

ASCENDING ORDER

[[3,0),(4,0]]

ABOVE PROCESS CAN BE EXECUTED PARALLELY

AFTER OVERLAYING

OFFSET = 0

SetAggr

0	0
1	2
2	2

ASCENDING ORDER

GOrd OrdSet

0	0	0
1	1	1
2	2	2

ASCENDING ORDER

AGE (PMM-0)

VNo	VL	GVNo	Count	Aggr
0	0	0	2	0
1	1	1	0	3
2	2	2	0	5

ASCENDING ORDER

Diagram illustrating the parallel execution of the PMM (Parallel Merge Sort) process across three stages (PMM-0, PMM-1, PMM-2) for a dataset with OFFSET=3.

Stage PMM-0:

- SetAggr:**

0	0 → 2
1	0 → 2

 ASCENDING ORDER
- GOrd OrdSet:**

0	3	0
1	4	1

 ASCENDING ORDER
- AGE (PMM-1):**

AGE (PMM-1)					
VNo		VL	GVNo		Count Aggr
0	0	0	16	0	0
1	1	1	28	5	6

 ASCENDING ORDER
- Output:** [(0,2),(1,0),(2,0)]

Stage PMM-1:

- SetAggr:**

0	0
1	0

 ASCENDING ORDER
- GOrd OrdSet:**

0	3	0
1	4	1

 ASCENDING ORDER
- AGE (PMM-1):** (Same as PMM-0)
- Output:** [(8,0),(9,2)]

Stage PMM-2:

- SetAggr:**

0	0
1	0

 ASCENDING ORDER
- GOrd OrdSet:**

0	3	0
1	4	1

 ASCENDING ORDER
- AGE (PMM-1):** (Same as PMM-0)
- Output:** [(5,1),(6,0),(7,1)]

Final Result: [(5,1),(6,0),(7,1)]

Parallel Execution: The above process can be executed parallelly.

Stage PMM-3:

- SetAggr:**

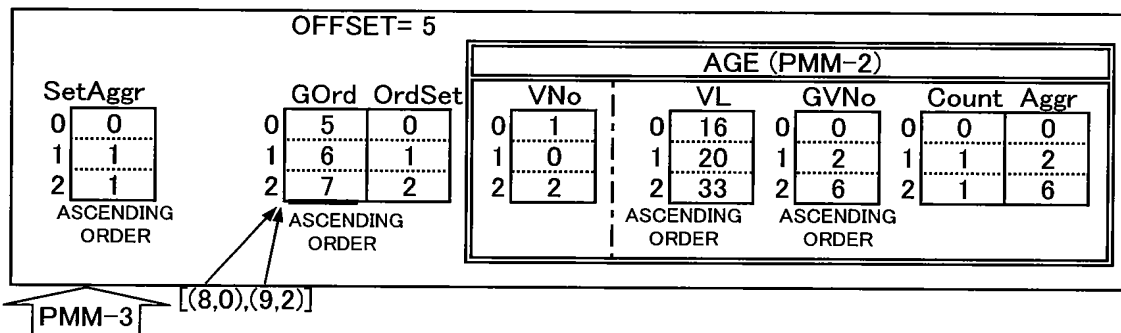
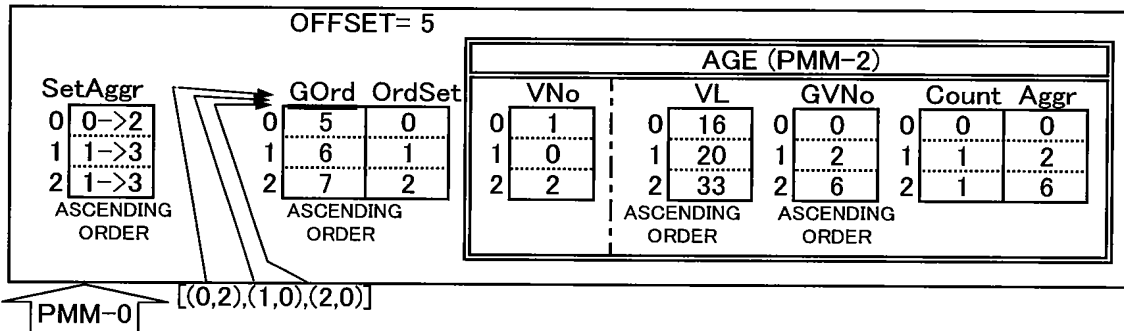
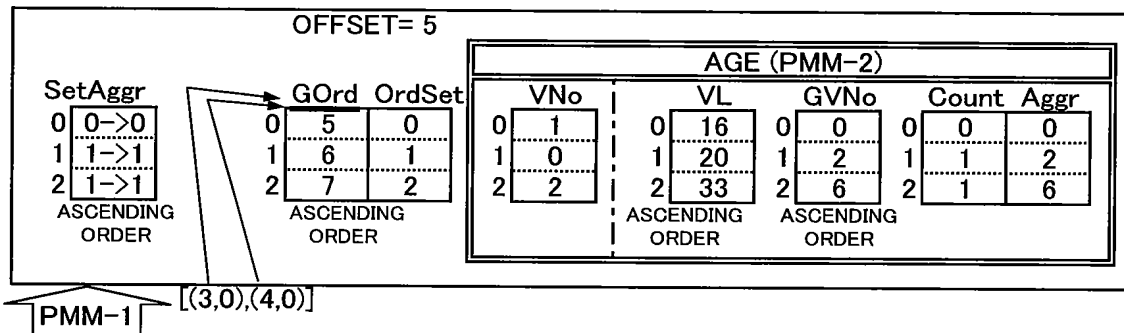
0	2
1	2

 ASCENDING ORDER
- GOrd OrdSet:**

0	3	0
1	4	1

 ASCENDING ORDER
- AGE (PMM-1):** (Same as PMM-0)

100



ABOVE PROCESS CAN BE
EXECUTED PARALLELY

AFTER OVERLAYING

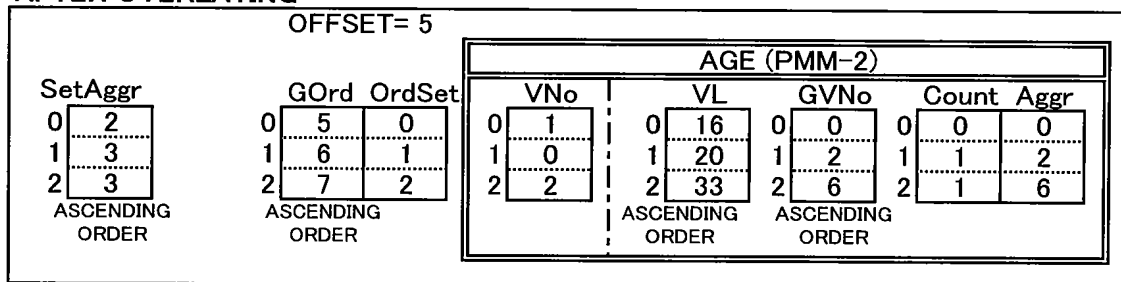


Fig.104

